# SOJT EXTRACT A

# OPERATOR'S MAINTENANCE OF MULTIPLEXER SETS

## AN/FCC-100(V)1 AND AN/FCC-100(V)1X

OPERATOR'S MAINTENANCE OF MULTIPLEXER SETS
AN/FCC-100(V)l AND AN/FCC-100(V)1X

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US ARMY STRATEGIC MICROWAVE COMMUNICATIONS REPAIRER COURSE
MOS 26V SKILL LEVELS 1 AND 2

# OPERATOR'S MAINTENANCE OF MULTIPLEXER SETS AN/FCC-100(V) 1 AND AN/FCC-100(V) 1X

## GENERAL

The operator's maintenance of Multiplexer Sets AN/FCC-100(V)1 and AN/FCC-100(V)1X, Subcourse

SOJT Extract is part of the Strategic Microwave Communications Repairer Course, MOS 26V, at skill levels 1 and 2. The SOJT Extract is designed to teach the basic requirements for maintenance of Multiplexer Set AN/FCC-100(V) at the operator's level. The extract is presented in three lessons, each lesson corresponding to an intermediate learning objective as indicated below.

Lesson 1: General Information of Multiplexer Set AN/FCC-100(V).

Task: Describe the functions of the major circuits of Multiplexer Set AN/FCC-100(V).

Conditions: Given information provided by lesson 1 of this subcourse.

Standard: Answer correctly 20 out of the 25 questions provided at the end of lesson 1.

Lesson 2: Operating Instructions.

Task: Operate Multiplexer Set AN/FCC-100(V).

Conditions: Given an operational Multiplexer Set AN/FCC-100(V) and GTA 11-10-32.

Whenever pronouns or other references denoting gender appear in this document they are written to refer to either male or female unless otherwise indicated.

Standard: Correctly perform three modes of operation in accordance with steps presented in lesson 2.

Lesson 3: Operator's Maintenance Instructions.

Task: Troubleshoot Multiplexer Set AN/FCC-100(V).

Conditions: Given some malfunction symptoms, a troubleshooting flow chart, and SOJT Extract.

Standard: Troubleshoot accurately, two out of three problems, in accordance with lesson 3 within a 20-minute time limit per problem.

INTRODUCTION TO MULTIPLEXER SETS AN/FCC-100(V)1
AND AN/FCC-100(V)1X

This booklet contains information and instructions for on-site operator's maintenance of Multiplexer Sets AN/FCC-100(V)1 and AN/FCC-100(V)1X.

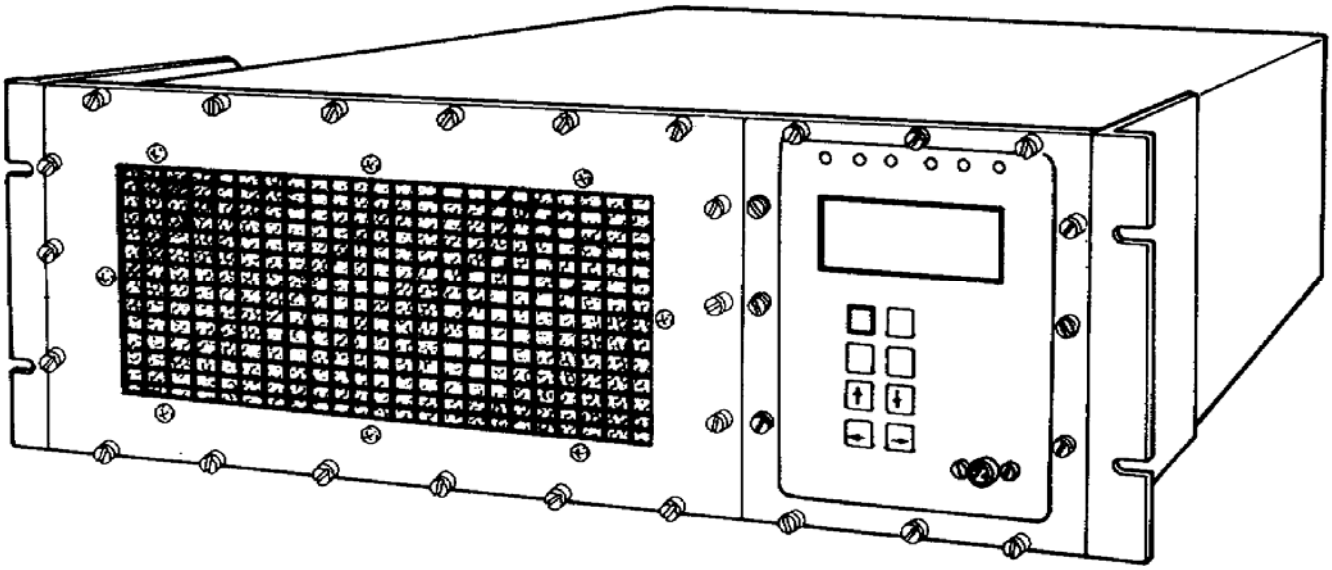


Figure 1. Multiplexer Set AN/FCC-100(V).

The information provides guidance on use of maintenance forms, describes the multiplexer set, and lists important performance data. The instructions cover operation, testing, and troubleshooting of the multiplexer set. Throughout this subcourse we will be referring to both multiplexer sets as the AN/FCC-100(V), whether it is a (V)1 or a (V)1X series; the differences between the two series is due to the two different types of power supplies that can be used. The AN/FCC-100(V)1 power supply is set up for a DC source (48 V DC). The AN/FCC-100(V)1X power supply is set up for an AC source with an option for either 115 V AC or 230 V AC. The selection for 115/230 V AC is done by manually setting an internal switch on the power supply module.

LESSON 1

GENERAL INFORMATION OF MULTIPLEXER SET AN/FCC-100(V)

Task: Describe the functions of the major circuits of Multiplexer Set AN/FCC-100(V).

Conditions: Given information provided by lesson 1 of this subcourse.

Standard: Answer correctly 20 out of the 25 questions provided at the end of lesson 1.

Reference: TM 11-5805-732-12

LEARNING EVENT 1: Maintenance Forms.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (TAMMS).

LEARNING EVENT 2: Description and Data.

1. Purpose and Use.

a. The Multiplexer Set AN/FCC-100(V) is a low-speed time-division multiplexer (LSTDM) with full-duplex transmit and receive capabilities. The following is a list of specifications covering the AN/FCC-100(V).

(1) Data rates: Up to 256K bits per second (BPS).

(2) Multiplexing capability: Up to 16 full-duplex circuits; mixture of synchronous, NRZ, asynchronous/isochronous (transitional encoding) and conditioned diphase.

(3) Data rates selection.

Capabilities: Aggregate -

| | |
|---|---|
| Synchronous NRZ | 1.2K, 2.4K, 4.8K, 9.6K, 16K, 32K, 50K, 56K, 64K, 128K, 192K, 256K bps. |
| Diphase | 1.2K, 2.4K, 4.8K, 9.6K, 16K, 32K, 50K, 56K, 64K. |

Port -

| | |
|---|---|
| Asynchronous/ Isochronous | Any rate to 2400 bps. |
| Synchronous | 75, 150, 300, 600, 1.2K, 2.4K, 4.8K, 7.2K, 8K, 9.6K, 16K, 19.2K, 32K, 64K, bps. |
| Diphase | 75, 150, 300, 600, 1.2K, 2.4K, 4.8K, 9.6K, 16K, 32K, 64K. |

Control terminal -

| | |
|---|---|
| Asynchronous | ASCII, 110, 300, 1.2K, 2.4K bps. |

(4) Built in test equipment (BITE).

Diagnostics: Continuously monitors and verifies operation; isolates faults to individual module and software level; off-line diagnostics.

b. The Multiplexer Set AN/FCC-100(V) is configured at the user's site to specific communications system requirements. Downline loading capability permits an operator to configure remote AN/FCC-100(V) from a centrally situated unit. This capability eliminates the need for an operator at a remote site during configuration.

c. The AN/FCC-100(V) is capable of multiplexing, demultiplexing, timing, control synchronization, framing, monitoring, and alarm reporting.

d. Timing for the AN/FCC-100(V) is provided by a highly accurate internal oscillator or from an external timing source. The LSTDM AN/FCC-100(V) was designed with data loopback capabilities and plug-in modules in order to simplify troubleshooting procedures performed on-site.

2. Description.

a. The Multiplexer Set AN/FCC-100(V) is capable of both transmitting and receiving:

(1) Data.

(2) Voice.

(3) Signaling information. (The signaling information is in the form of a single mission bit stream (MBS). The mission bit stream will be referred to in this booklet as the aggregate, capable of handling up to 16 separate channels.)

b. A time-division principle is used to place all channels onto a single synchronous aggregate. The individual channels are determined by selection of interchangeable plug-in port modules. The aggregate is determined by selection of interchangeable plug-in aggregate modules. Once selected, the port and aggregate modules are configured by the operator.

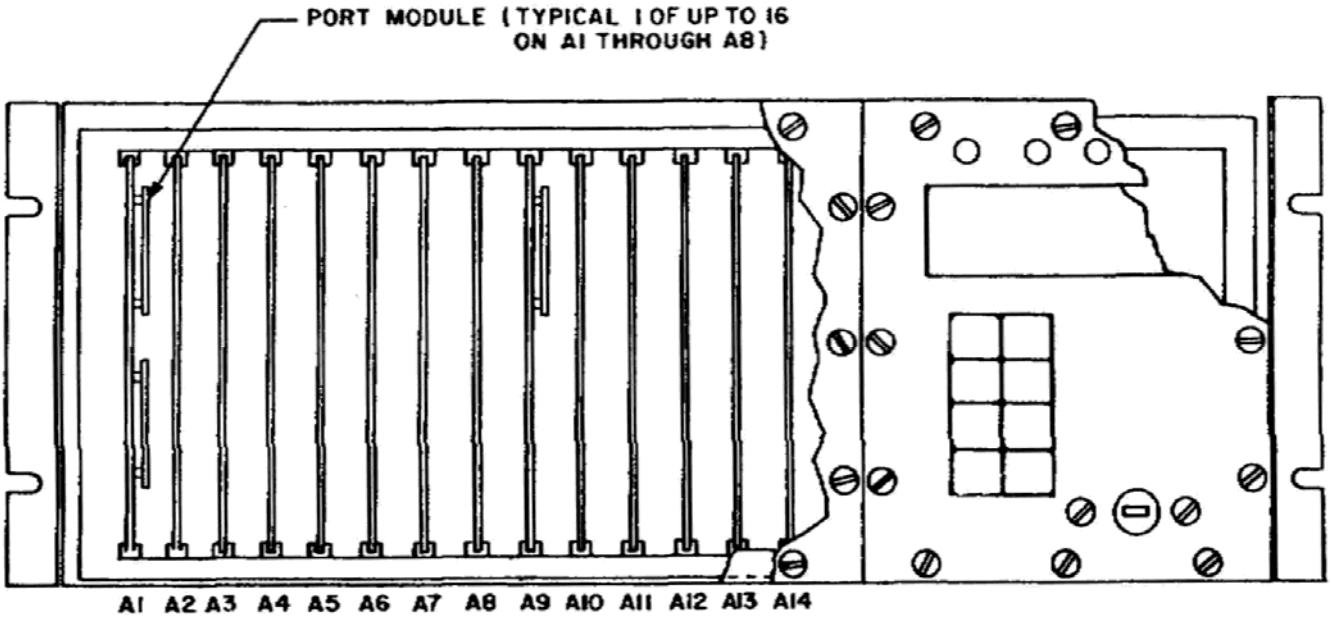
c. The AN/FCC-100(V) consists of multiplexer-demultiplexer, time-division, low-speed TD-1349(P) /FCC-100(V) and the modules and chassis presented in (1) through (8) and (11).

(1) Transmit processor module. This module contains the logic circuitry and memory devices which are required to send user data to the aggregate. The module also performs some diagnostic checks (see figure 2).

(2) Receive processor module. This module contains the logic circuitry and memory devices which are required to accept user data from the aggregate. The module also performs most of the diagnostic checks associated with built-in testing (see figure 2).

(3) Shared logic module. This module contains the circuitry which is required by both processor modules. The memory circuits that contain both active and offline configurations are located on this module (see figure 2).

(4) BITE modules. This module contains comparator circuits and LEDs which are used to monitor specific voltages and clock signals. A test probe can plug into this module. The probe is used to monitor test points on the other modules (see figure 2).




NOTE:
MODULE ACCESS PANEL REMOVED

| POSITION | MODULE |
|---|---|
| A1 THROUGH A8 | PORT CARRIER |
| A9 | AGGREGATE CARRIER (WITH AGGREGATE MODULE) |
| A10 | TRANSMIT PROCESSOR |
| A11 | RECEIVE PROCESSOR |
| A12 | SHARED LOGIC |
| A13 | BITE |
| A14 | INTERFACE |

Figure 2. Common Equipment Modules.

(5) Port carrier module. This module contains the circuitry common to receiving data from, and sending data to, user terminals. Each carrier can support up to two port modules (see figure 2). The port carrier modules connect serial format user terminals to the parallel format bus structure used for multiplexing and demultiplexing within the AN/FCC-100(V). Each port carrier is used in conjunction with port modules which plug into connectors on the port carrier module circuit board. Transmit signals from the user terminal enter the port carrier module from the backplane. The signals pass through circuits on the carrier module, go to the appropriate port module, return to the carrier, and are sent to other multiplexer modules through the backplane. Receive signals from the demultiplexer enter the port carrier module from the

backplane. The signals are processed by the port carrier and sent to the appropriate port module. The port module returns the receive signals to the port carrier which sends them to the user terminals.

(6) Aggregate carrier module. This module contains the circuitry required to send data to, and receive data from, the aggregate. This module requires a specific aggregate module to provide the drive circuits (see figure 2). The aggregate carrier module provides parallel to serial and serial to parallel data conversion. This module is also the source of the baud rate clock signals required for data transmission. The aggregate carrier module is used in conjunction with an aggregate module which plugs into a connector (J1) mounted on the carrier module. The aggregate carrier module connects to the other AN/FCC-100(V) modules through the backplane wiring and to the user aggregate channel through backplane connector J17. Two types of aggregate diphase and NRZ are available. One of these types must be installed into the aggregate carrier module.

(a) Diphase aggregate (PL-1460/FCC): This module handles synchronous conditioned diphase data. All ports, regardless of type, have data changed to synchronous conditioned diphase for the purpose of transmission over the aggregate. Data rates range from 1200 bps to 64,000 bps.

(b) NRZ (PL-1461/FCC): This module handles synchronous nonreturn to zero (NRZ) data. All ports, regardless of type, have data changed to NRZ for the purpose of transmission over the aggregate. Data rates range from 1200 bps to 256,000 bps.

(7) Interface module. This module permits communication between the user and the AN/FCC-100(V). The module converts operator inputs into commands which configure and control the AN/FCC-100(V). It also converts signals from the AN/FCC-100(V) into output displays (see figure 2).

(8) Front panel. This module is the physical and electrical link between the operator/organization maintenance personnel and the interface module (see figure 2).

(9) Power Supply Group OP-143/FCC-100(V). This group consists of an AC power supply, a fan assembly, and a line filter. The AC supply provides the necessary DC voltage levels from either a 115 or 230 volts AC source. The fan provides air circulation through the unit. The line filter provides necessary power line isolation.

(10) Power Supply Group OP-144/FCC-100(V). This group consists of a DC power supply, a fan assembly, and a line filter. The DC supply provides the necessary DC voltages from a -48 volt DC source. The fan provides air circulation through the unit. The line filter provides necessary power line isolation.

(11) Chassis. The chassis provides harness wiring interconnections for the modules and power supply group. The chassis also provides the input/output connection to the user's system.

(12) Detailed theory of operation.

(a) The AN/FCC-100(V) is controlled by a pair of microprocessors. Each processor governs a portion of overall operation. Operational functions are independent with no redundancy. The microprocessors function by moving information (i.e., data bits) to and from locations defined by addresses or by manipulation of data bits according to stored operating instructions. Information is transferred between modules by way of either the transmit processor or the receive processor on an 8-bit data bus and a 16-bit address bus. Memory for the processors is contained in integrated circuits.

(b) Operating instructions for the AN/FCC-100(V) are stored in read only memory (ROM) and electrically programmed read only memory (EPROM). Temporary values, such as operator entries and internally derived results, are stored in volatile random access memory (RAM). Stored values, such as configuration information, are stored in nonvolatile electrically alterable read only memory (EAROM). Volatile memory is lost upon removal of power.

(13) Ports. Three types of ports are currently available:

(a) Diphase (PL-1457/FCC): This module can handle synchronous conditioned diphase data. Data rates range from 75 bps to 64,000 bps.

(b) Synchronous (PL-1458/FC): This module handles NRZ synchronous data. Data ranges from 75 bps to 64,000 bps.

(c) Isochronous (PL-1459/FCC): This module handles isochronous and asynchronous data. Data rates can be any speed up to 2400 bps.

(14) Transmission rates. The allowable rates for ports and the aggregate depend upon port rate mix and the port/aggregate mix. The aggregate must always exceed the sum of the port rates. Additional bandwidth is required for overhead information and port inefficiencies. Isochronous ports use at least four times the rate that their nominal rate indicates.

LEARNING EVENT 3: System Signal Flow.

1. The user's data terminal equipment (DTE) is attached to connectors on the AN/FCC-100(V) backplane. The backplane also interconnects the modules.

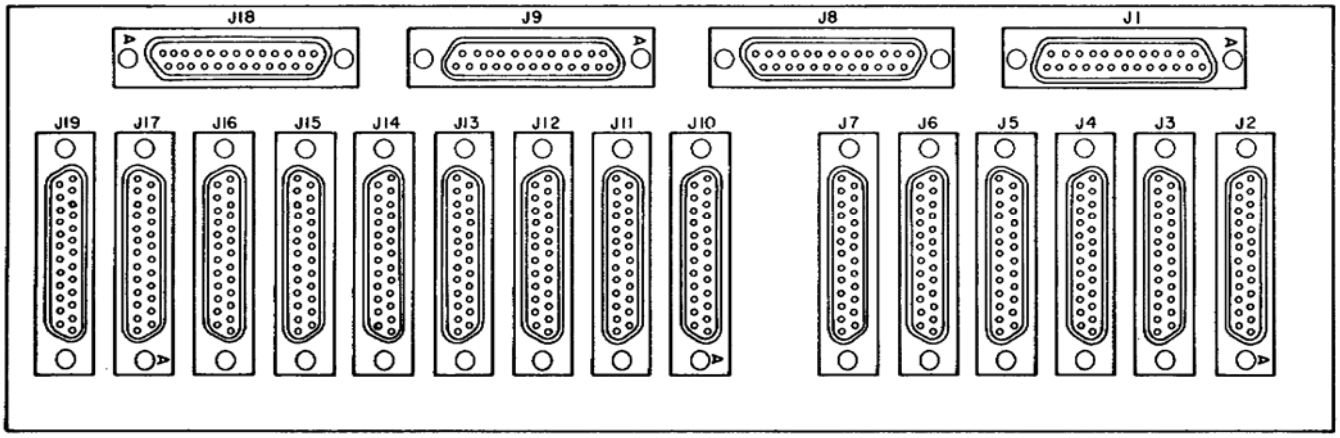



Figure 3. Backplane Connectors.

2. General. Signals from the DTE are sent to the port channels. Each terminal goes to a different port. The transmit processor and shared logic modules multiplex the data and send it to the aggregate and aggregate carrier modules (see figure 4). The data and associated timing are sent to a backplane connector which attaches to the user's data communications equipment (DCE). Incoming signals from the user's DCE go to a connector on the backplane. The signals are sent to the aggregate and aggregate carrier modules. The data is demultiplexed by the receive processor and shared logic modules. Signals are then sent to the appropriate port and on the user's DTE.

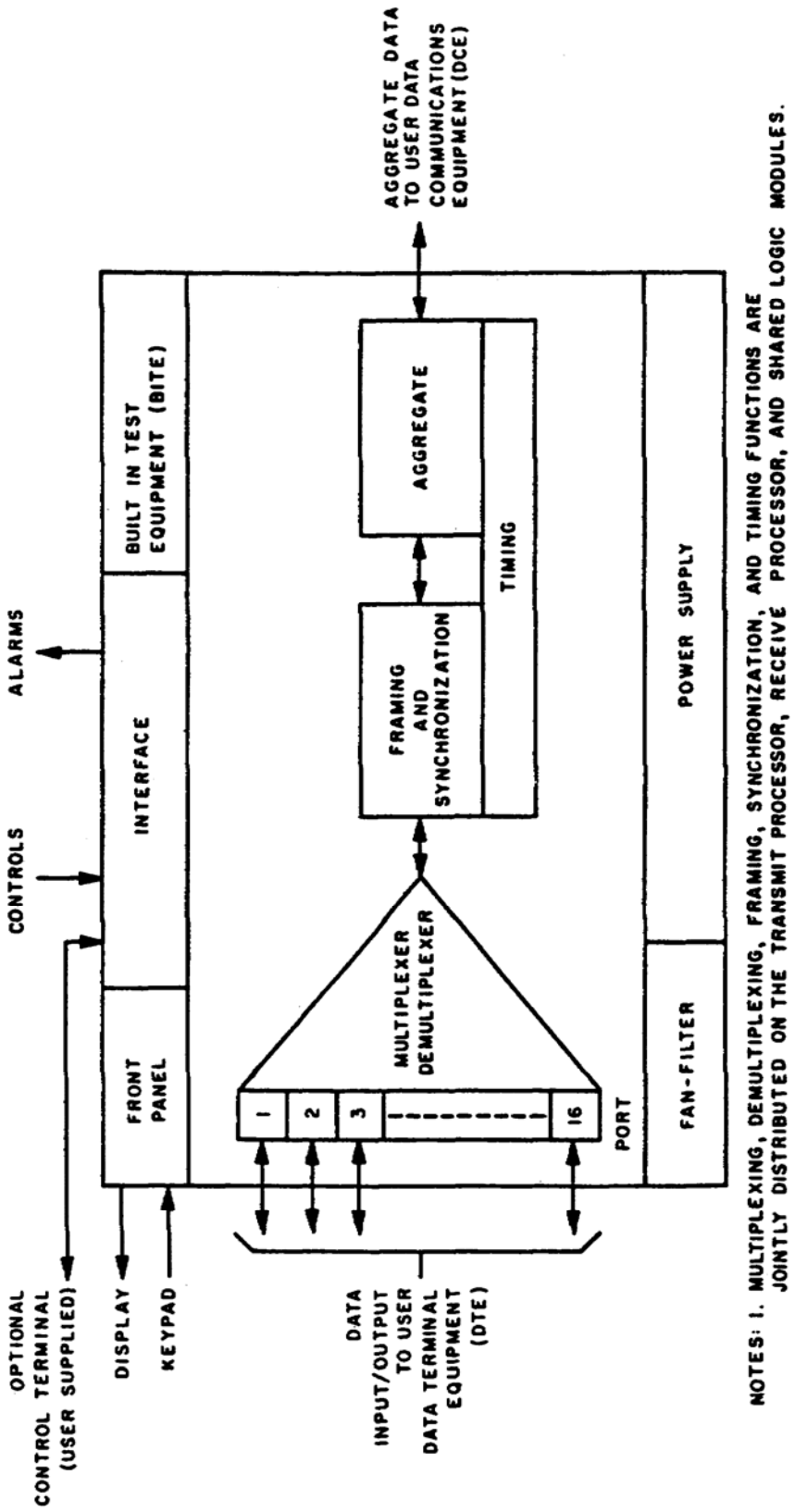



Figure 4. Functional Diagram.

3. Data Flow.

a. Transmit.

(1) Data from user terminals enters the AN/FCC-100(V) on backplane connectors. Data signals are carried by the backplane to the card edge connectors on the port carrier modules.

(2) Data can be sensed at TP-10 (odd port) and TP-9 (even port) on the port carrier module. The data goes to the appropriate port modules. The transmit processor gets data from the ports one character at a time and sends it to the aggregate and aggregate carrier modules. (The shared logic module is not part of the user data path. It provides control information which is used by the transmit processor module.) The aggregate carrier module sends each character to the backplane and out the aggregate backplane connector (see figure 5). Along with the user data, the transmit processor adds overhead information to maintain character and frame synchronization.

b. Receive.

Data from the user's aggregate channel enters the AN/FCC-100(V) on the backplane connector. These data signals are carried by the backplane to the aggregate carrier module (see figure 5). The receive processor demultiplexes the incoming data and sends characters over the backplane wiring to the appropriate port carrier module. (The shared logic module is not part of the user data path. It provides control information which is used by the receive processor module.) The port module processes each character and sends the resulting signal (i.e., data and clock) to the user's terminal. Receive data can be sensed at TP-12 (odd port) and TP-11 (even port) on the port carrier module.

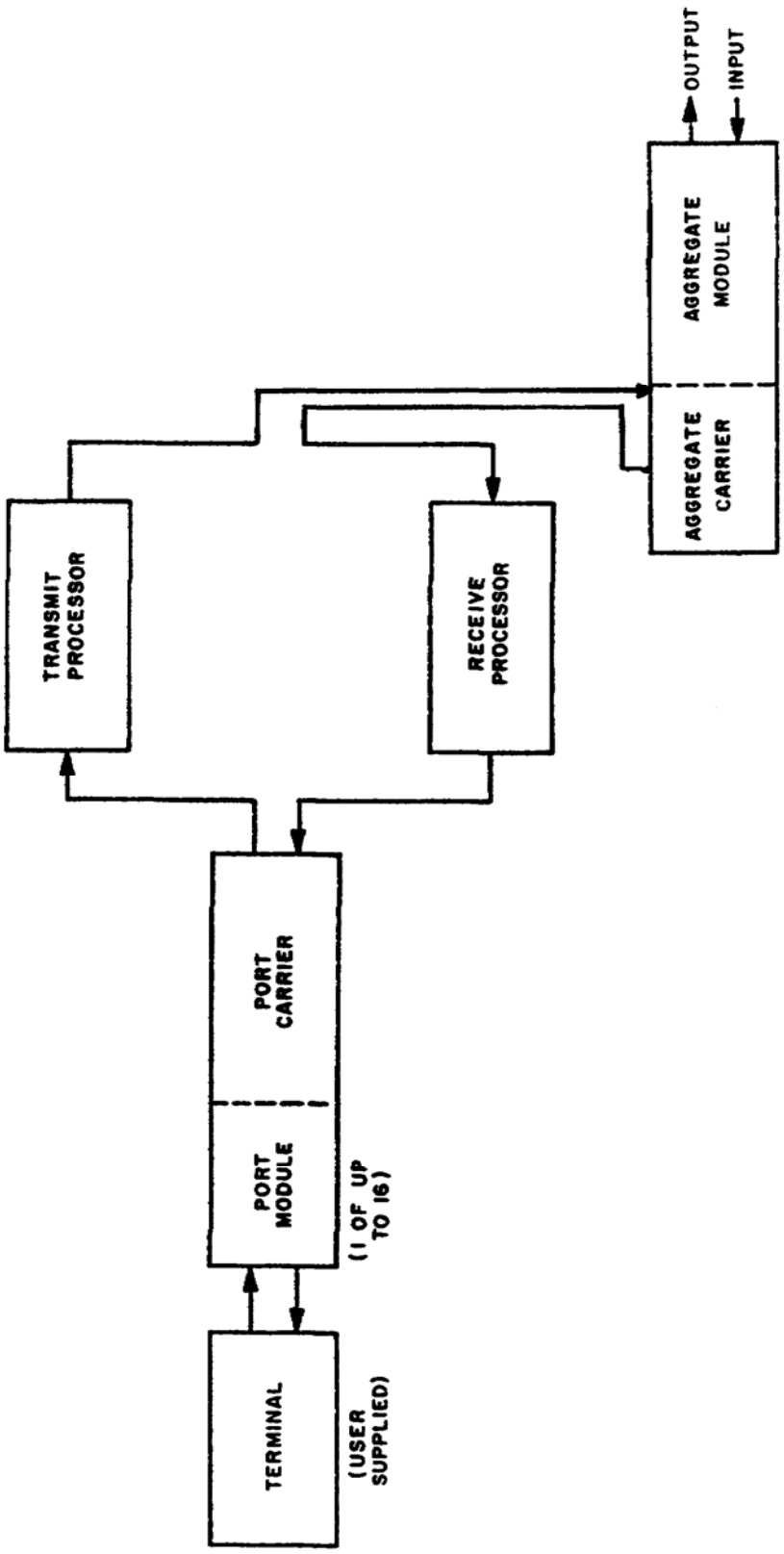



Figure 5. Data Flow, Overall.

c. Loopback.

(1) Data can be looped at the local port or remote port. A local port loopback at the near end looks like a remote port loopback to the far end AN/FCC-100(V)(see figure 6). A port loopback is equivalent to placing a jumper between TP-10 and TP-12 (odd port) or TP-9 and TP-11 (even port).

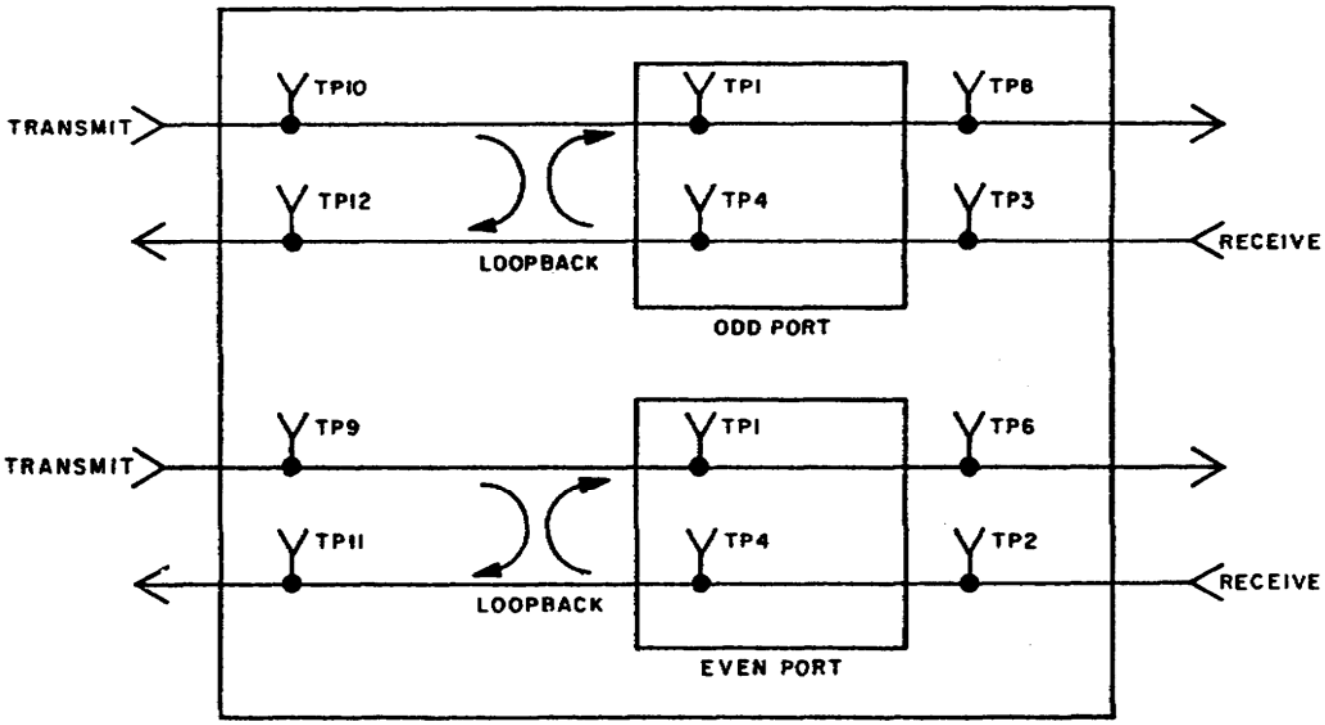



Figure 6. Data Flow, Port.

(2) An aggregate loopback (local only) is equivalent to placing a jumper between the transmit and receive data lines at the transmit input side of the aggregate module (see figure 7). During an aggregate loopback, all ports at the far end unit receive a stream of all 1's.

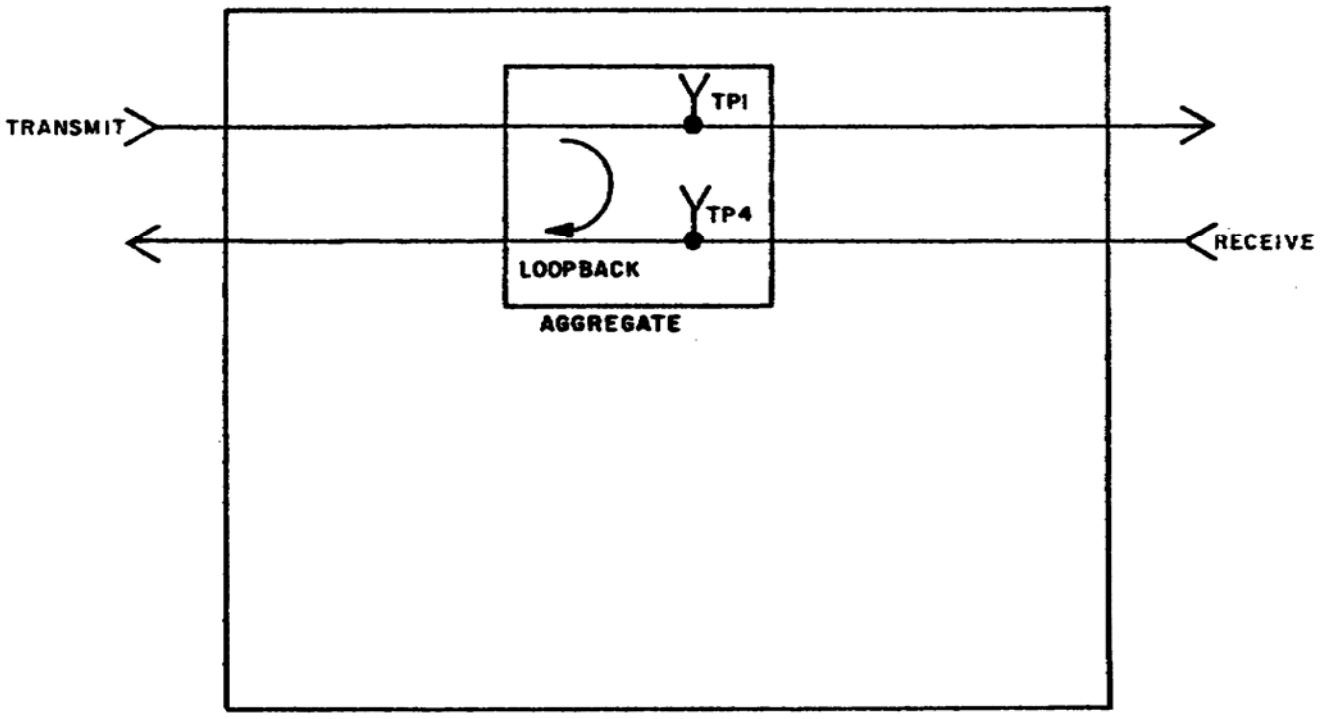



Figure 7. Data Flow, Aggregate.

d. Control.

Control of the AN/FCC-100(V) is performed by the transmit processor and receive processor modules. The shared logic module contains the memory circuits which retain system operating parameter values (see figure 8). The transmit and receive processors automatically call on the values in order to process signals. The processor modules command the port and port carrier modules to receive data from, and send data to, the user's DTE. These modules also command the aggregate and aggregate carrier modules to send data to, and receive data from, the user's DCE. Operator command inputs can be entered from either the front panel or a (user-supplied) ASCII control terminal. These commands are placed in temporary memory located on the interface module. A store command transfers the information from the temporary memory to permanent off-line memory on the shared logic card.

e. Timing.

There are two oscillator circuits in the AN/FCC-100(V). The oscillator on the shared logic module provides the clock signal for the transmit and receive processor. The oscillator on the aggregate carrier module provides a processor clock for the interface module as well as the baud rate data transmission. An external clock may be supplied by the user. External clock is used as a reference for the oscillator in the aggregate carrier module.

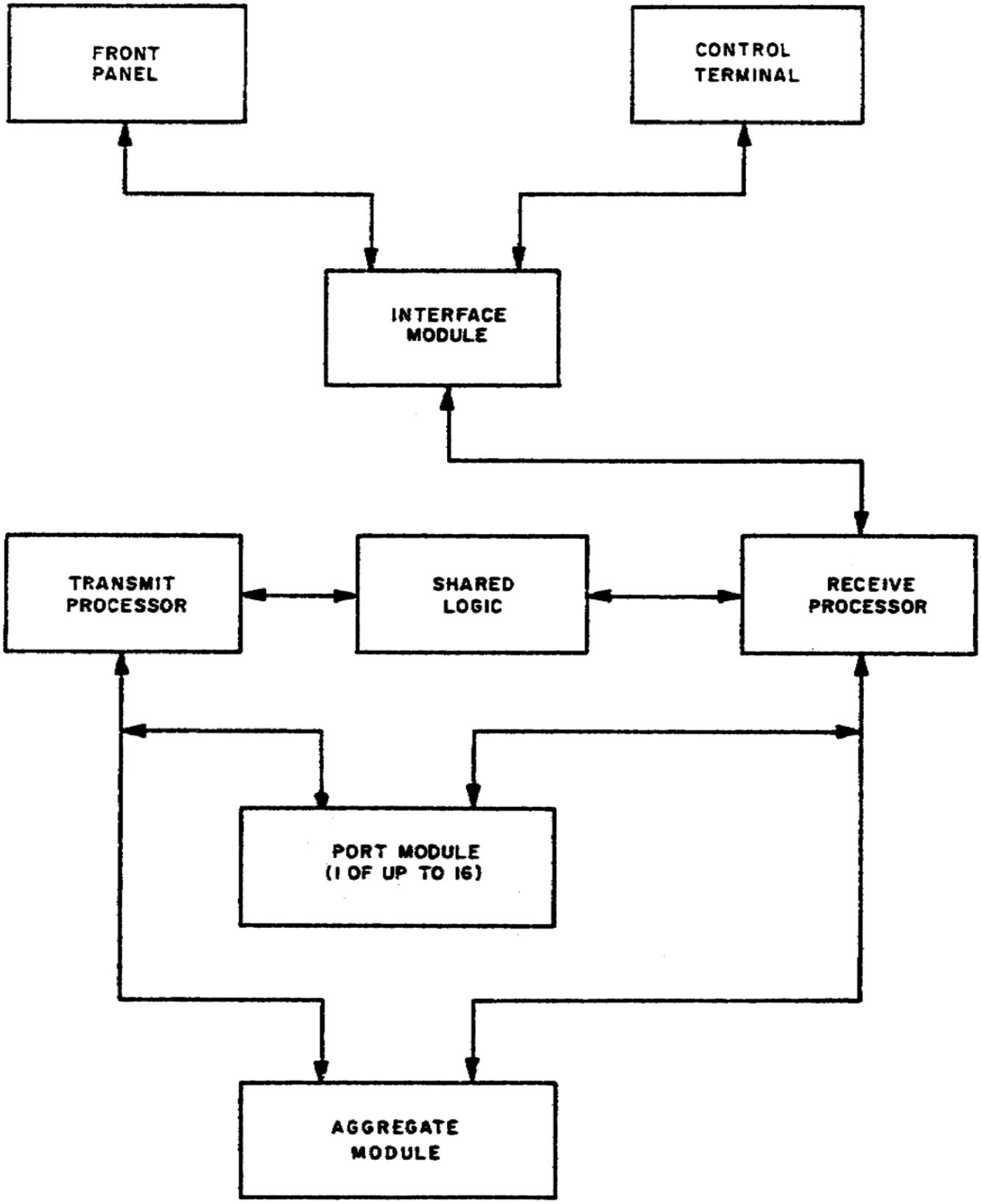



Figure 8. Control Diagram.

(a) Processor clocks (figure 9). The processors on the transmit and receive processor modules require a 4 MHz clock. A 16 MHz crystal frequency is divided by four on the shared logic

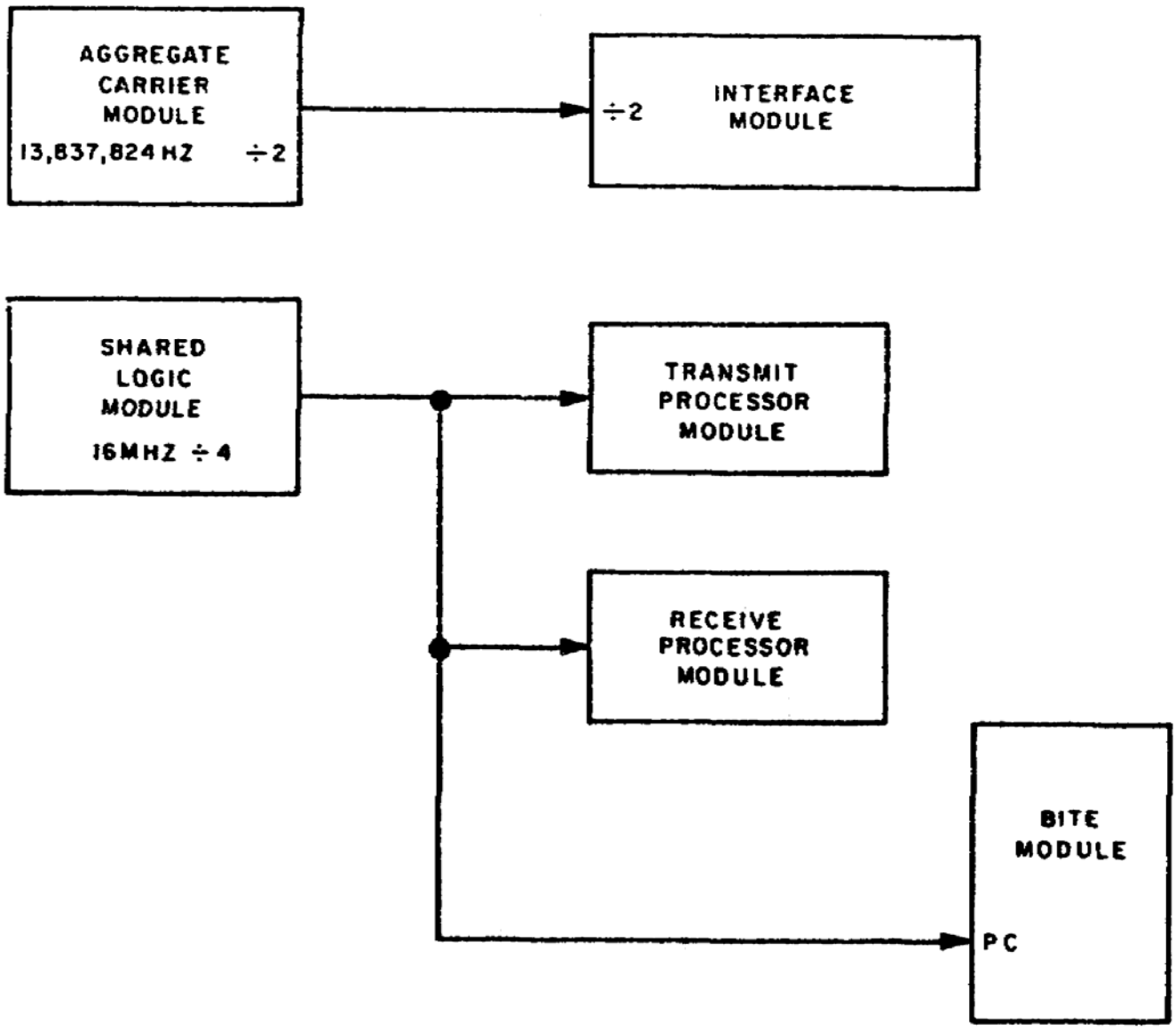



Figure 9. Processor Clocks.

module. The resulting 4 MHz signal is sent to both processor modules and to the processor clock (PC) circuit on the BITE module. The 13,837,824 Hz crystal is divided by two on the aggregate carrier module. The resulting 6,918,912 Hz is sent to the interface module and again divided by two. This 3,459,456 Hz clock signal is used by the processor on the interface module for front panel operation.

(b) Baud rate clock (figure 10). The baud rate crystal frequency of 13,837,824 Hz is divided down to the aggregate baud rate selected by the operator. If external clock is selected and supplied, the internal divided down signal is referenced to the external clock. Aggregate transmit clock (ATC) is sent by the aggregate carrier module to the transmit processor module. The transmit processor uses this signal to time multiplexing. The transmit processor module also constructs the frame structure chart which is used for bandwidth allocation. Aggregate receive clock (ARC) is sent to the receive processor module and is used to time demultiplexing. Master transmit clock (MTC) and master receive clock (MRC) are sent to the port carrier module(s). These four signals (ATC, ARC, MTC, and MRC) are also sent to circuitry on the BITE module. The aggregate carrier module sends transmit clock to the DCE and accepts receive clock from the DCE.

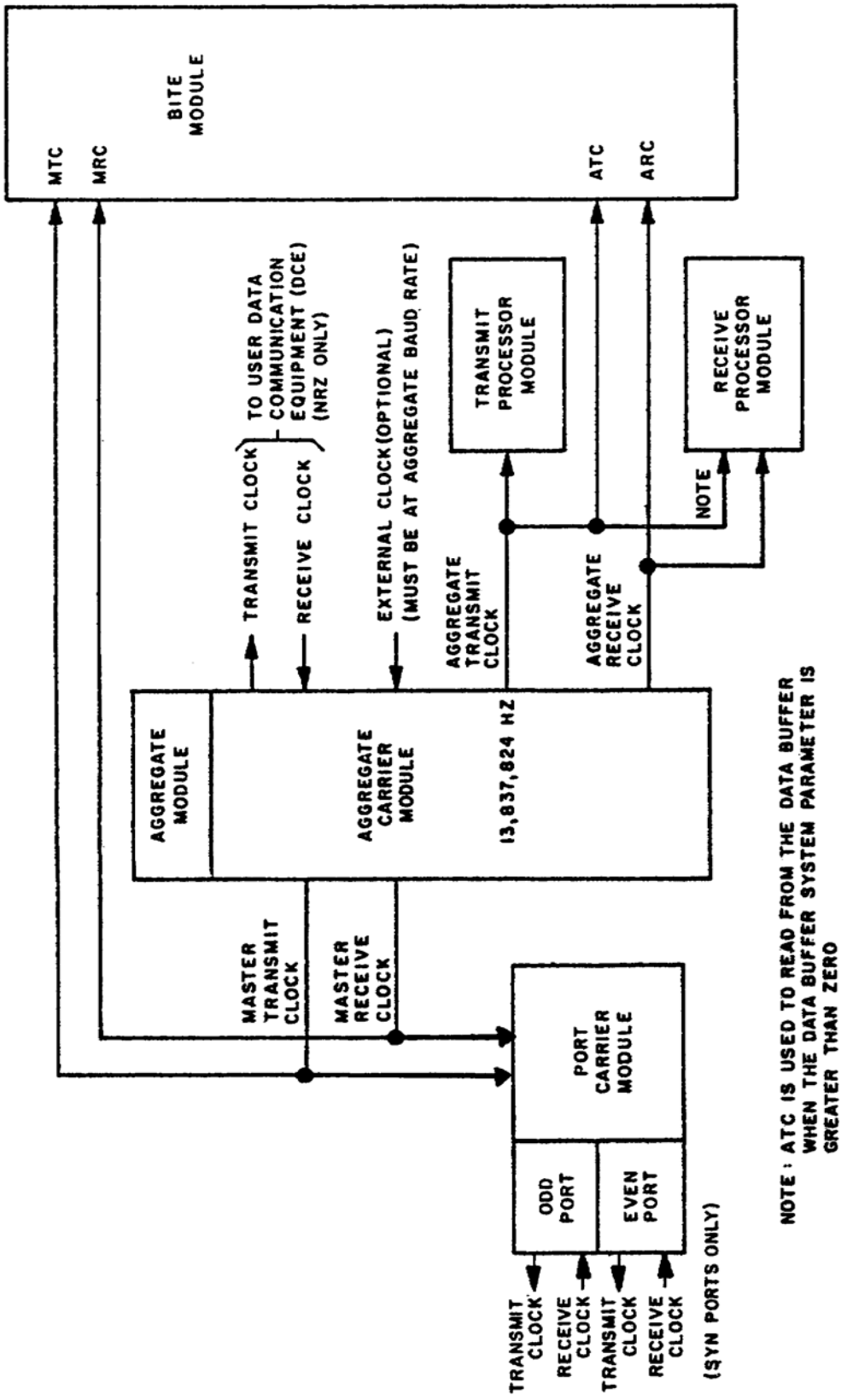



Figure 10. Baud Rate Clock.

f. Software BITE.

(1) The AN/FCC-100(V) has capability of performing software driven BITE checks. An operator initiates a BITE check through the front panel. The front panel command is sent to the interface module which commands the receive and transmit processor modules to begin test routines.

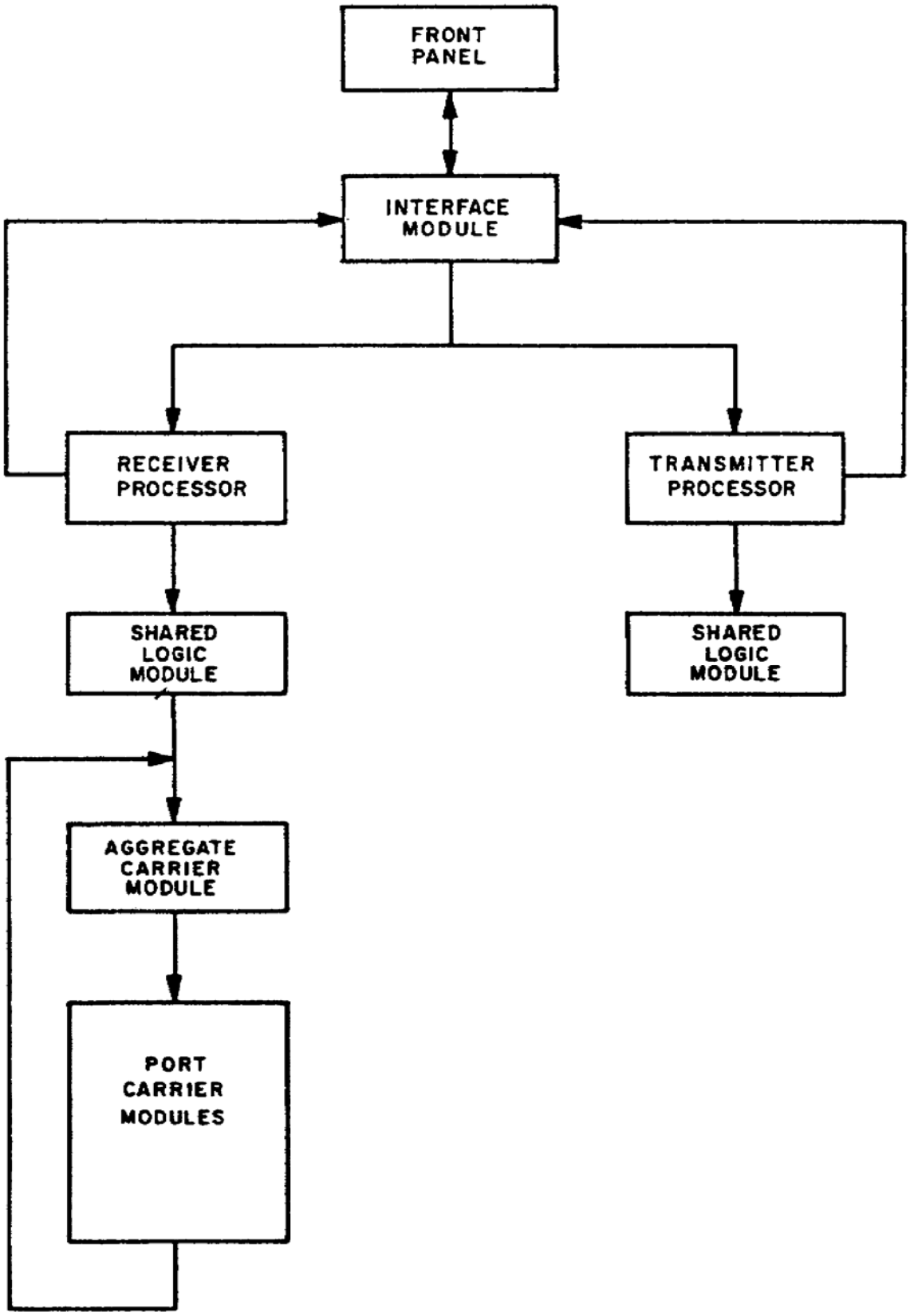



Figure 11. Software BITE.

(2) Each processor module first tests its own internal logic and memory circuits. Next, each processor checks a portion of the shared logic module. The receive processor checks interface circuits and volatile memory. The transmit processor checks configuration memory circuits. The receive processor checks the aggregate carrier module and then goes on to check each port carrier module successively. Testing of the ports and aggregate will normally continue until manually interrupted by an operator initiated front panel entry. Should a malfunction be detected, the test routine will automatically stop. The processor which detected the fault will send an error message through the interface module to the front panel. If an internal malfunction prevents initiation of the software BITE check from the front panel, jumper strap 6 on the shared logic module can be used to start the BITE check. In this situation, depending on the nature of the malfunction, the front panel might not be able to display the error message. Refer to chapter 5, Organizational Maintenance Instructions, TM 11-5805-732-12 for a description of BITE check indication.

NOTE: Only authorized key personnel can perform the software BITE check. The software BITE check completely interrupts user data traffic. Such phase is not considered part of the operator level task.

g. Hardware BITE.

NOTE: If the +5 V DC is lost, no LED can light.

The BITE module contains circuits which monitor AN/FCC-100(V) operation. Hardware BITE is always active and does not interrupt user data traffic. The signals which the BITE module can monitor are: 1) power supply voltage levels, 2) system clocks, and 3) module edge test points (probe inputs).

(a) Power supply. The power supply voltage level detectors monitor the outputs of the power supply. Should any of the three output voltages go out of tolerance the corresponding LED will go out. If the +5 V DC output is between 5.6 V DC and 4.5 V DC, the +5 V LED will be on. If the -5 V DC output is between -5.8 V DC and -4.4 V DC, the -5 V LED will be on. If the -40 V DC output is between -48 V DC and -33.9 V DC, the -40 V LED will be on.

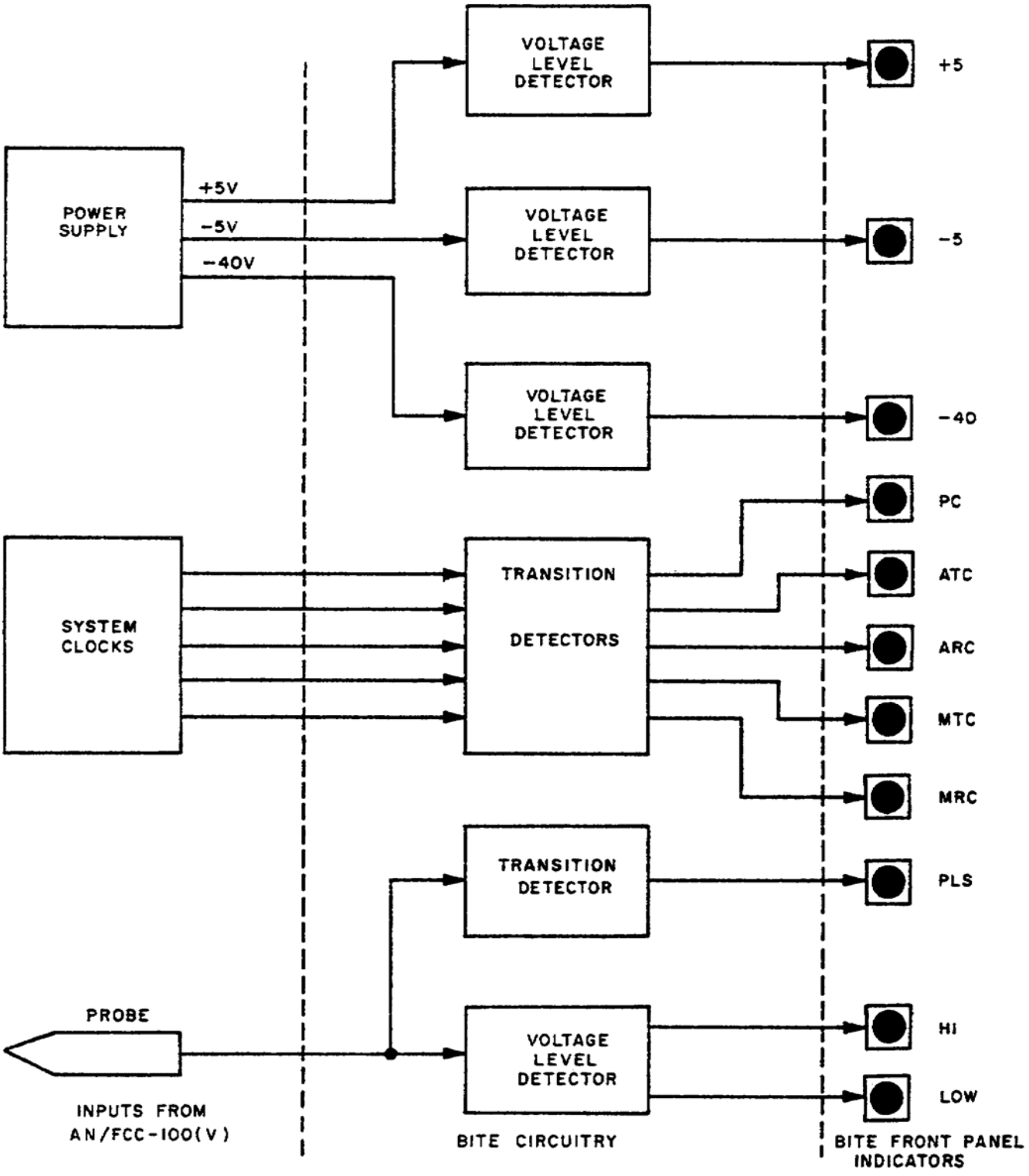



Figure 12. Hardware BITE.

(b) System clocks. The five transistion detector LEDs which monitor system clocks are labeled PC (processor clock), ATC (aggregate transmit clock), ARC (aggregate receive clock), MTC (master transmit clock), and MRC (master receive clock). These LEDs are normally off and remain off as long as clock signals are present. These detectors do not indicate whether the clock signals are at the correct frequencies. As long as the input to each detector is at least 1 kHz, the associated LED will remain off. Should any of the five LEDs come on, the input clock signal to that circuit has been lost.

(c) Probe inputs. The probe input connector on the BITE module is connected to a voltage level detector and a transition detector. Voltages below .8 volt are sensed as a low. Voltages above 2 volts are sensed as a high. A pulse must have a duration of at least 10 milliseconds in order to light either the hi or low LEDs. Pulse frequencies of 30 Hz and above (7 MHz maximum) will cause the PLS (pulse) LED to come on. The following examples illustrate possible BITE probe inputs and LED indications.

1. No connection to BITE probe: The LOW LED remains on.

2. Probe connected to a 10 Hz 2-volt peak square wave. The HT and LOW LEDs alternate on and off. The flash rate is 10 times per second. PLS LED remains off.

3. Probe connected to 40 Hz 2-volt peak square wave. The HI LED will flash at 40 times per second and will appear to remain on steady. The PLS LED will be on.

4. Probe connected to 9600 Hz clock. The PLS LED will light-and remain on. Both HI and LOW LEDs will be off.

5. Probe connected to 300 bps user data. The PLS LED will remain on. Certain transmitted ASCII characters (e.g., upper case A and O and lower case x) contain a series of at least four O's or 1's and will cause the HI and LOW LEDs to flash intermittently.

LESSON VERIFICATION 1

INSTRUCTIONS TO STUDENT:

This is a self-graded exercise to help you determine the knowledge acquired at this point of your training. You must answer 20 questions, or more, correctly in order to achieve a passing score. There is no need for higher level supervision at this time; but, your first line supervisor will initial your completed work. You have 20 minutes to complete this lesson verification, and you are authorized the use of TM 11-5805-732-12 and the information contained in this subcourse. The answers to these questions are contained at the end of this exercise.

Circle true or false answer.

1. The Multiplexer Set AN/FCC-100(V) is capable of both transmitting and receiving: 1) data, 2) voice, and 3) signaling information.

   TRUE FALSE

2. On Power Supply Group OP-143/FCC-100(V), the AC supply provides the necessary DC voltage levels from either a 115 or 230 volts AC source.

   TRUE FALSE

3. Operating instructions for the AN/FCC-100(V) are stored in read only memory (ROM) and electrically programmed read only memory (EPROM).

   TRUE FALSE

4. The interface module converts operator inputs into commands which configure and control the AN/FCC-100(V).

   TRUE FALSE

5. The data rate of Multiplexer Set AN/FCC-100(V) is up to 256 k bps.

   TRUE FALSE

6. BITE stands for basic ingresion test equipment.

   TRUE FALSE

7. The Multiplexer Set AN/FCC-100(V) is not configured at the user's site to specific communications system requirements.

   TRUE FALSE

8. Timing for the AN/FCC-100(V) is provided only by an external clock.

TRUE FALSE

Answer multiple-choice questions.

9. The _____ module contains the logic circuitry and memory devices which are required to send user data to the aggregate.

a. receive processor
b. port carrier
c. transmit processor
d. shared logic

10. A test probe can plug into this module. The probe is used to monitor test points on the other modules. The module is called the _____ module.

a. shared logic
b. BITE
c. aggregate carrier
d. None of the above.

11. There are three types of ports currently available with the AN/FCC-100(V):

a. Diphase, isochronous, and synchronous.
b. Diphase, asynchronous, isochronous.
c. Asyn/iso, diphase, NRZ.
d. None of the above.

12. On the port carrier module, data can be sensed at

a. TP1 and TP3.
b. TP12 and TP13.
c. TP6 and TP9.
d. TP10 and TP9.

13. This module is not part of the user data path. It is the _____ module.

    a. shared logic
    b. port
    c. port carrier
    d. aggregate carrier

14. Data from the user's aggregate channel enters the AN/FCC-100(V) on the backplane connector. These data signals are carried by the backplane to the _____ module.

    a. shared logic
    b. interface
    c. port carrier
    d. aggregate carrier

15. A port loopback is equivalent to placing a jumper cable between

    a. TP1 and TP2.
    b. TP10 and TP12 (odd port), TP9 and TP11 (even port).
    c. TP5 and TP6.
    d. None of the above.

16. Control of the AN/FCC-100(V) is performed by the

    a. shared logic module.
    b. interface module.
    c. transmit and receive processor modules.
    d. None of the above.

Answer questions accurately.

17. How many oscillator circuits are used in the AN/FCC-100(V) for timing?

18. On the shared logic module, what frequency is the crystal oscillating at?

19. Does a software BITE check interrupt user data traffic?

20. What signals can the hardware BITE module monitor?

21. Downline loading capability, permits the operator to perform what kind of operation?

22. What is the function of the front panel?

23. What does EAROM mean?

24. Two types of aggregate are available. Name these two types.

25. Is the shared logic module part of the user data traffic?

SUPERVISOR'S INITIALS: _____

KEY ANSWER SHEET TO LESSON VERIFICATION 1

1. True, paragraph 2a, learning event 2.
2. True, paragraph 2c(9), learning event 2.
3. True, paragraph 2c(12)(b), learning event 2.
4. True, paragraph 2c(7), learning event 2.
5. True, paragraph 1a(1), learning event 2.
6. False, paragraph 1a(4), learning event 2.
7. False, paragraph 1b, learning event 2.
8. False, paragraph 1d, learning event 2.
9. c, paragraph 2c(1), learning event 2.
10. b, paragraph 2c(4), learning event 2.
11. a, paragraph 2c(13), learning event 2.
12. d, paragraph 3a, learning event 3.
13. a, paragraph 3a, learning event 3.
14. d, paragraph 3b, learning event 3.
15. b, paragraph 3c, learning event 3.
16. c, paragraph 3d, learning event 3.
17. Two oscillators, paragraph 3e, learning event 3.
18. 16 MHz, paragraph 3e(a), learning event 3.
19. Yes, paragraph 3f, learning event 3.
20. Power supply voltage levels, system clocks, probe inputs, paragraph 3g, learning event 3.
21. Configure remote AN/FCC-100(V), paragraph 1b, learning event 2.
22. Link OP/ORG maintenance personnel to interface..., paragraph 2c(8), learning event 2.

23. Electrically alterable read only memory, paragraph 2c(12)(b), learning event 2.

24. Disphase and NRZ, paragraph 2c(6), learning event 2.

25. No, paragraph 3a, learning event 3.

LESSON 2

OPERATING INSTRUCTIONS

Task: Operate Multiplexer Set AN/FCC-100(V).

Conditions: Given an operational Multiplexer Set AN/FCC-100(V) and GTA 11-10-32.

Standard: By correctly performing three modes of operation, in accordance with steps presented in lesson 2.

Reference: TM 11-5805-732-12

LEARNING EVENT 1: Controls and Indicators.

1. The AN/FCC-100(V) has 16 port input/output channels. Balanced ports have 124-ohm termination. Unbalanced ports have a termination greater than 4000 ohms. The maximum signaling rate is 64,000 bps. As presented earlier, there are three port modules available:

a. Diphase - A single bit stream carries both user data and associated timing.

b. Synchronous - Data are composed of equal duration pulses which are accompanied by a separate clock signal.

c. Isochronous - Data are composed of unequal pulses which are not associated with a clock signal.

2. The AN/FCC-100(V) has a synchronous aggregate input/output. The aggregate may be either conditioned diphase or nonreturn to zero (NRZ). Conditioned diphase is a transmission technique in which data and clock are integrated into a single synchronous bit stream. The aggregate can be either balanced (impedance either 124-ohm or 78-ohm) or unbalanced. The maximum transmission rate is 64,000 bps for conditioned diphase and 256,000 bps for NRZ.

NOTE: All operator settings are made by push button switches or through a user control terminal. No hazard or damage to equipment will result from any combination of operator commands.

3. All controls and indicators are located on the front panel. The front panel (see figure 13) contains an eight-button keypad, alphanumeric display, six indicator lights, and a POWER ON/OFF switch. The POWER ON light is green and is on when power is on. The LOOPBACK lights are amber and are normally off. The other front panel lights (ALARMS) are red and normally off. The following is a list of indicators and controls, and a description of their functions.

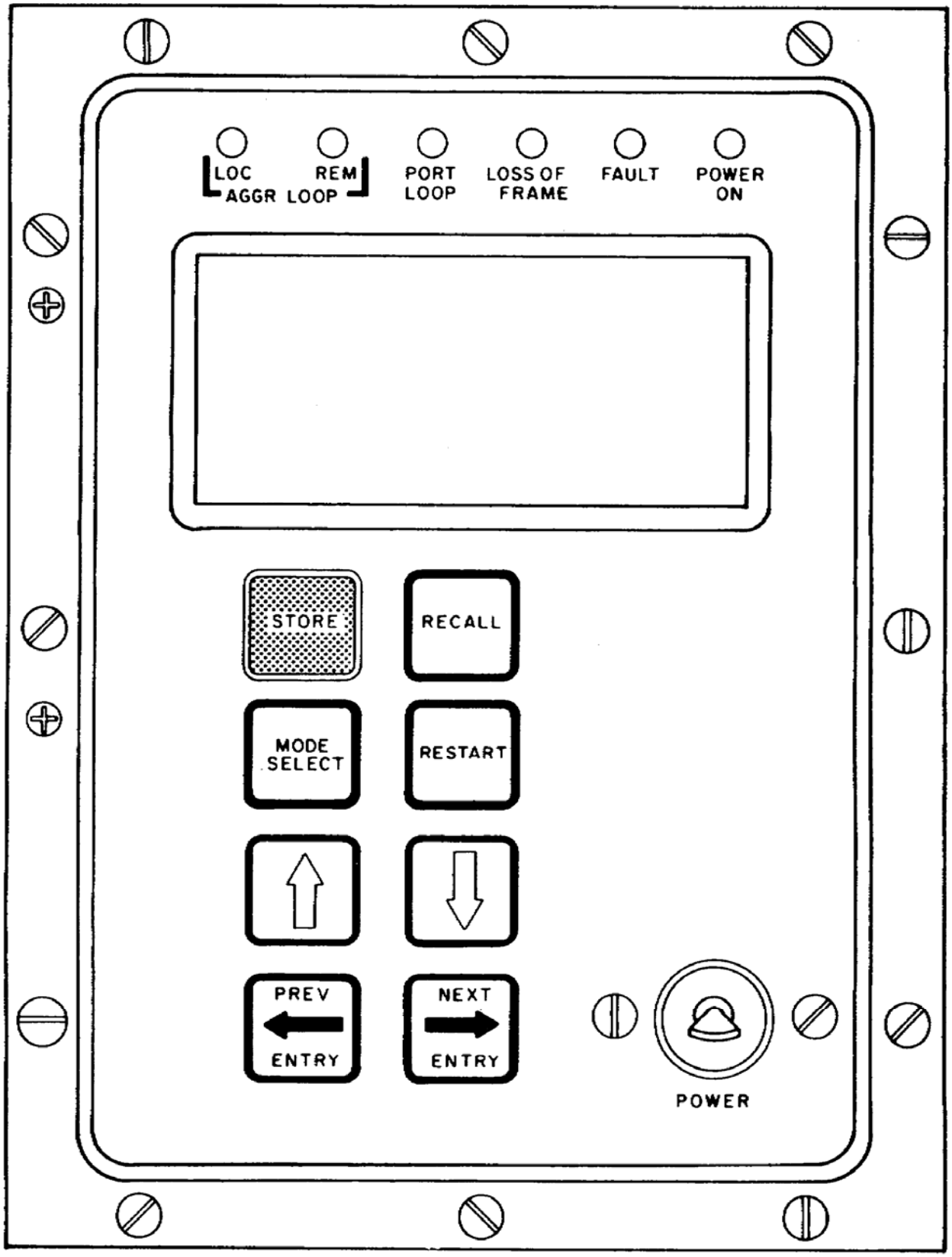



Figure 13. Front Panel.

| INDICATORS | FUNCTION |
|---|---|
| LOC AGGR LOOP | When lit, indicates local AN/FCC-100(V) is in local aggregate loopback (amber). |
| REM AGGR LOOP | When lit, indicates that far end AN/FCC-100(V) is in loopback (amber). |
| PORT LOOP | When lit, indicates that at least one port is in a loopback condition (amber). |
| LOSS OF FRAME | When lit, indicates that the local AN/FCC-100(V) has lost frame synchronization (red). |
| FAULT | When lit, indicates an internal fault has been detected (red). |
| POWER ON | Indicates power (green). |

| CONTROLS | FUNCTION |
|---|---|
| DISPLAY WINDOW | Presents AN/FCC-100(V) operational data to the operator. |
| STORE | Places currently displayed parameters into off-line memory. |
| | Directs the AN/FCC-100(V) to perform a command. |
| RECALL | Returns displayed configuration to previous state. |
| MODE SELECT | Causes the front panel to enter the mode currently displayed. |
| RESTART | Returns displayed configuration to previous state. |
| UP ARROW | The up arrow brings the cursor to the previous line/page. |
| DOWN ARROW | The down arrow brings the cursor to the next line/page. |
| PREV ENTRY | Moves the display to the previous choice without a field. |
| NEXT ENTRY | Advances the display to the next choice within a field. |

| CONTROLS | FUNCTION |
|---|---|
| POWER | Controls input power. |

LEARNING EVENT 2: Computation of Aggregate Rate.

1. The total port bandwidth plus overhead bandwidth must be less than or equal to the aggregate rate. To calculate the aggregate required to support a particular port mix, follow the steps listed below. At this time, you will be using GTA 11-10-32.

a. Add the nominal rates of all the ports being used.

b. Select an aggregate (refer to table II, GTA 11-10-32) greater than the value determined in a above.

c. For diphase or synchronous ports, add the bandwidth values for each port (refer to table IIA, GTA 11-10-32).

d. For isochronous ports, add the bandwidth values for each port (refer to table IIB, GTA 11-10-32).

e. Find the overhead bandwidth for the aggregate rate selected in b above (refer to table IIIC, GTA 11-10-32).

f. Add the results from c, d, and e above.

g. If the total in f above, is greater than the aggregate selected in b above, the aggregate is not big enough. Select a larger aggregate and repeat steps b through f above. Alternately, select one or more ports with slower rates and repeat steps b through f above.

2. Sample of Bandwidth Computation. For a system with eight ports of the following types and rates, proceed as indicated in steps a through g below:

| | Type | Rate |
|---|---|---|
| Port 1 | Synchronous | 300 |
| Port 2 | Synchronous | 1200 |
| Port 3 | Diphase | 75 |
| Port 4 | Diphase | 150 |
| Port 5 | Isochronous | 67 |
| Port 6 | Isochronous | 1200 |
| Port 7 | Isochronous | 75 |
| Port 8 | Isochronous | 300 |

a. The sum of the nominal rates is 5700. (The isochronous terminal rate for port 5 is added as a nominal 75. Refer to table I, GTA 11-10-32, lowest rate available is <75.)

b. The aggregate rate must be at least 9600 (IAW table II, GTA 11-10-32).

c. All diphase and synchronous NRZ port bandwidth values, IAW table IIIA, GTA 11-10-32, will be added together:

| Port | Bandwidth Value |
|---|---|
| 1 | 300 |
| 2 | 1200 |
| 3 | 150 |
| 4 | 150 |
| Total | 1800 |

d. All isochronous ports bandwidth values, IAW table IIIB, GTA 11-10-32, will be added together.

| Port | Bandwidth Value |
|---|---|
| 5 | 300 |
| 6 | 4800 |
| 7 | 300 |
| 8 | 1200 |
| Total | 6600 |

e. The overhead bandwidth for 9600 is 400 (table IIIC, GTA 11-10-32).

f. Add all total bandwidth values plus overhead:

| | |
|---|---|
| Step c | 1800 |
| Step d | 6600 |
| Step e | 400 |
| Total | 8800 |

g. Since 8800 is not greater than 9600, an aggregate of 9600 can support the sample port mix.

LEARNING EVENT 3: Common Equipment Module Strapping.

NOTE: Have supervisor provide you with spare module(s) required to practice the strapping, and the strapping tool necessary (BITE probe) located on the inside portion of the module access panel.

1. There are four common equipment modules that have jumper straps. The modules are located in positions A14, A9, A12, and A1 through A8. The common equipment modules are located behind the module access panel.

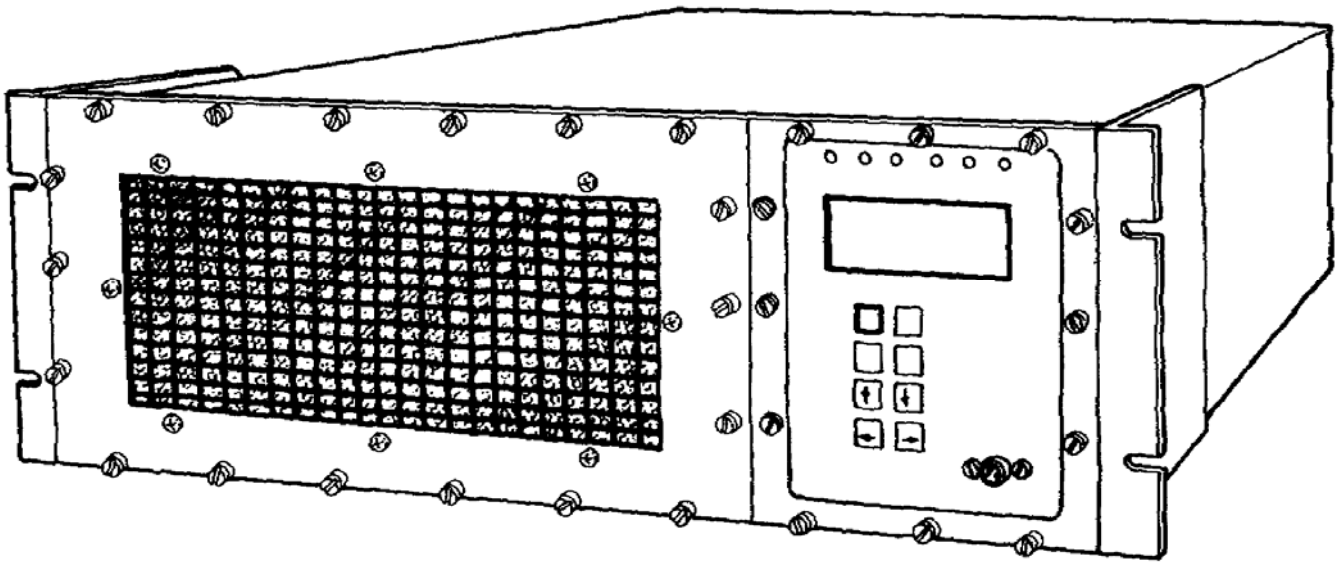
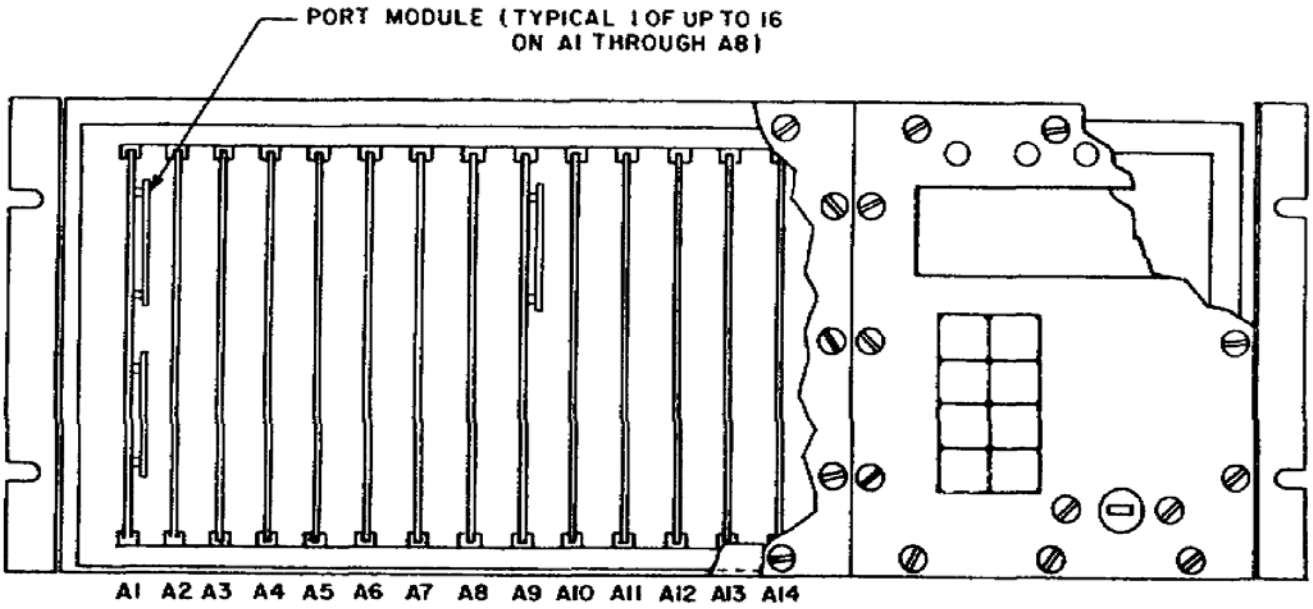


Figure 14. AN/FCC-100(V) With the Module Access Plate.

NOTE: To set the jumper straps, it is necessary to remove the module access panel and slide the specific module out of the AN/FCC-100(V).




NOTE:
MODULE ACCESS PANEL REMOVED

| POSITION | MODULE |
|---|---|
| A1 THROUGH A8 | PORT CARRIER |
| A9 | AGGREGATE CARRIER (WITH AGGREGATE MODULE) |
| A10 | TRANSMIT PROCESSOR |
| A11 | RECEIVE PROCESSOR |
| A12 | SHARED LOGIC |
| A13 | BITE |
| A14 | INTERFACE |

Figure 15. AN/FCC-100(V) With Module Access Panel Removed Showing Location of Common Equipment Modules.

a. Interface module (A14).

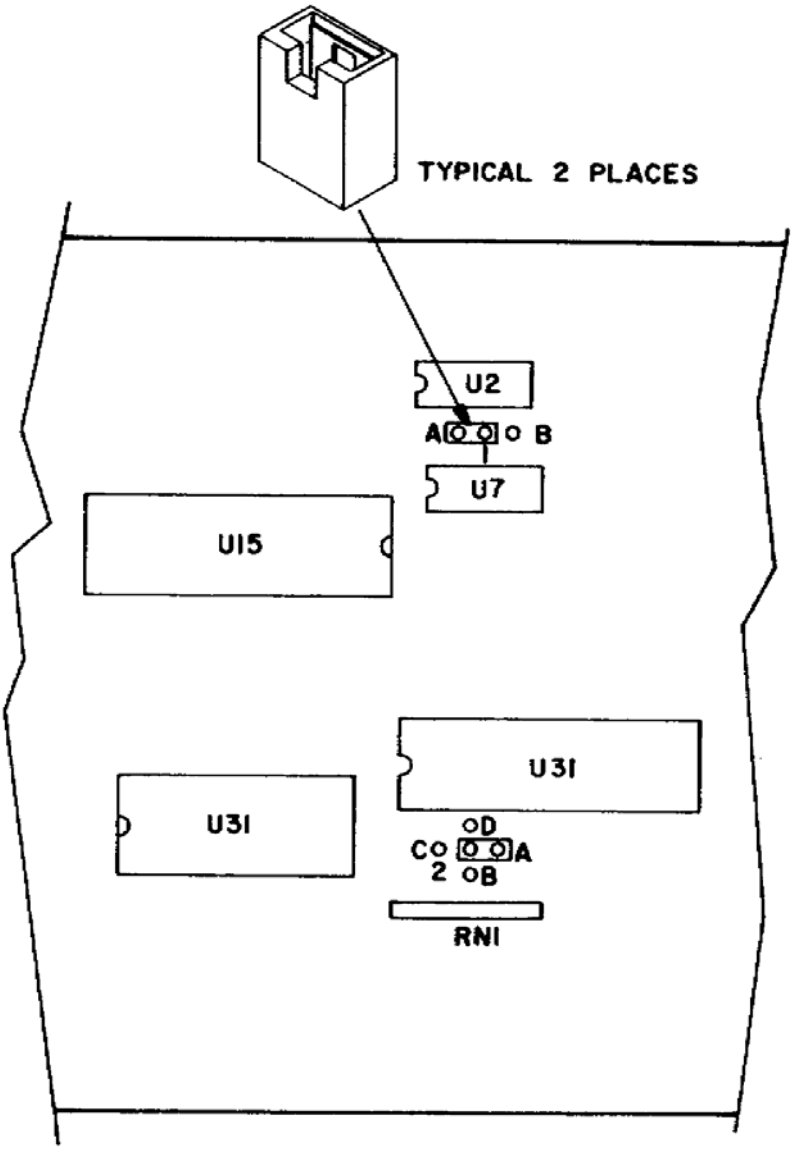
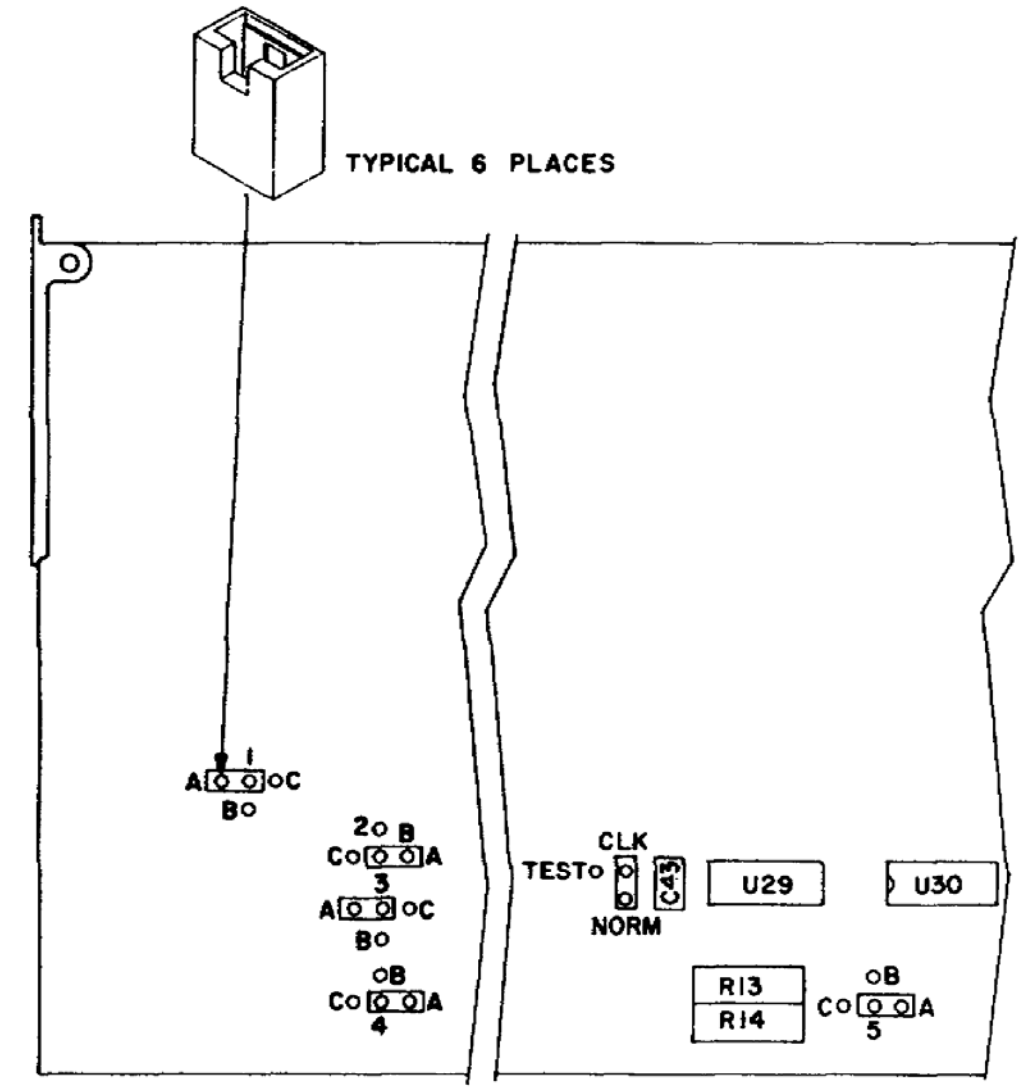



Figure 16. Interface Module Strapping (A14).

This module contains straps for an optional (user provided) control terminal. Jumper strap number 1 sets the mark sense of the interface. (If no terminal is used, jumper 1 must be set for position b; i.e., no terminal.) Jumper strap number 2 sets the interface baud rate. These straps permit the AN/FCC-100(V) to interface with most asynchronous (start-stop) control terminals.

b. Aggregate carrier module (A9).




| JUMPER 1-5 | TERMINATIONS | CLK | |
|---|---|---|---|
| A | UNBALANCED | NORM | FIELD OPERATION |
| B | 124 OHM BALANCED | TEST | FACTORY TEST |
| C | 78 OHM BALANCED | | |

Figure 17. Aggregate Carrier Module Strapping (A9).

This module contains six jumper straps. Jumpers 1, 2, 3, and 4 set termination for recovered receive clock out. Jumper 5 sets termination for external clock in. The jumper for clock (CLK) must be set to NORM. Jumpers 1 through 5 are connected to either the A, B, or C terminations determined by site operation.

c. Shared logic module (A12).

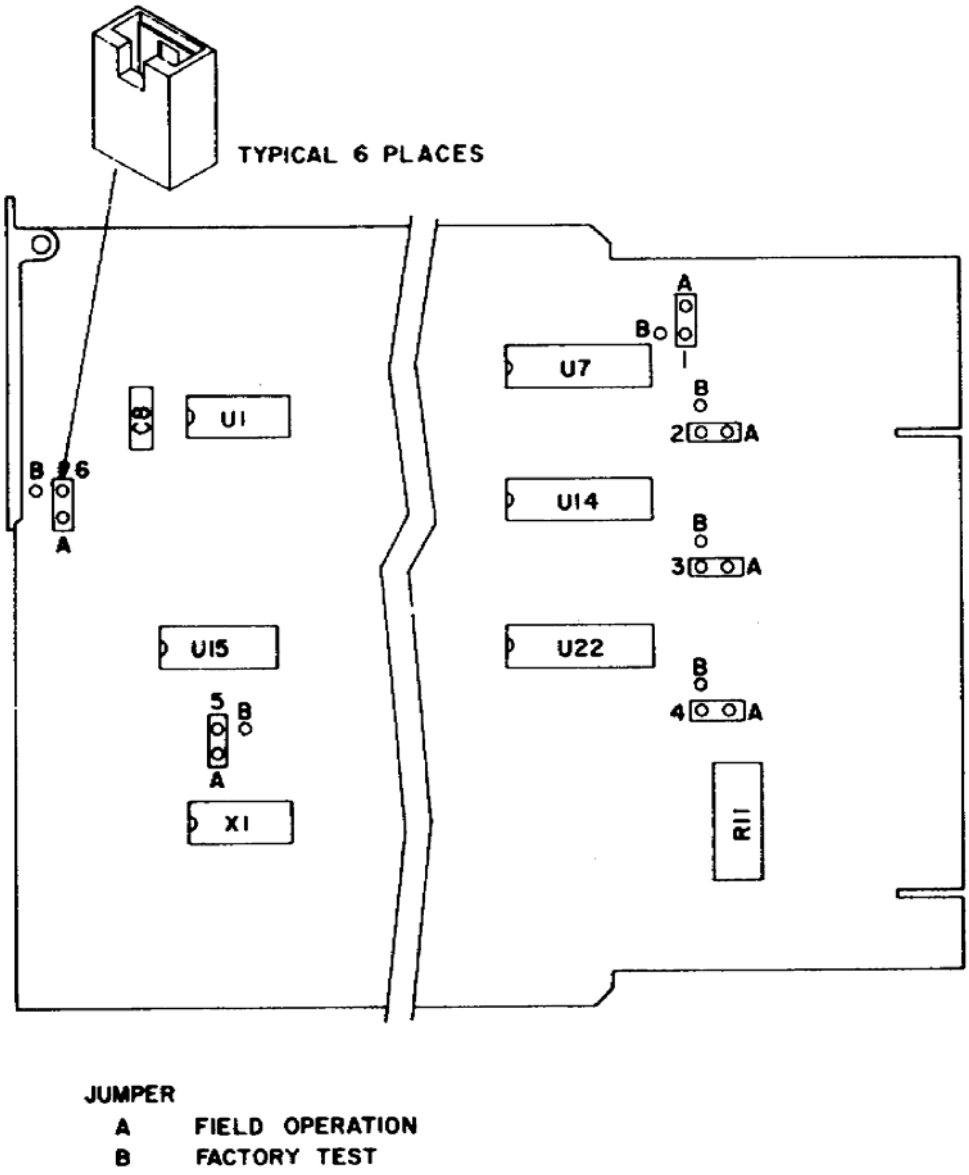
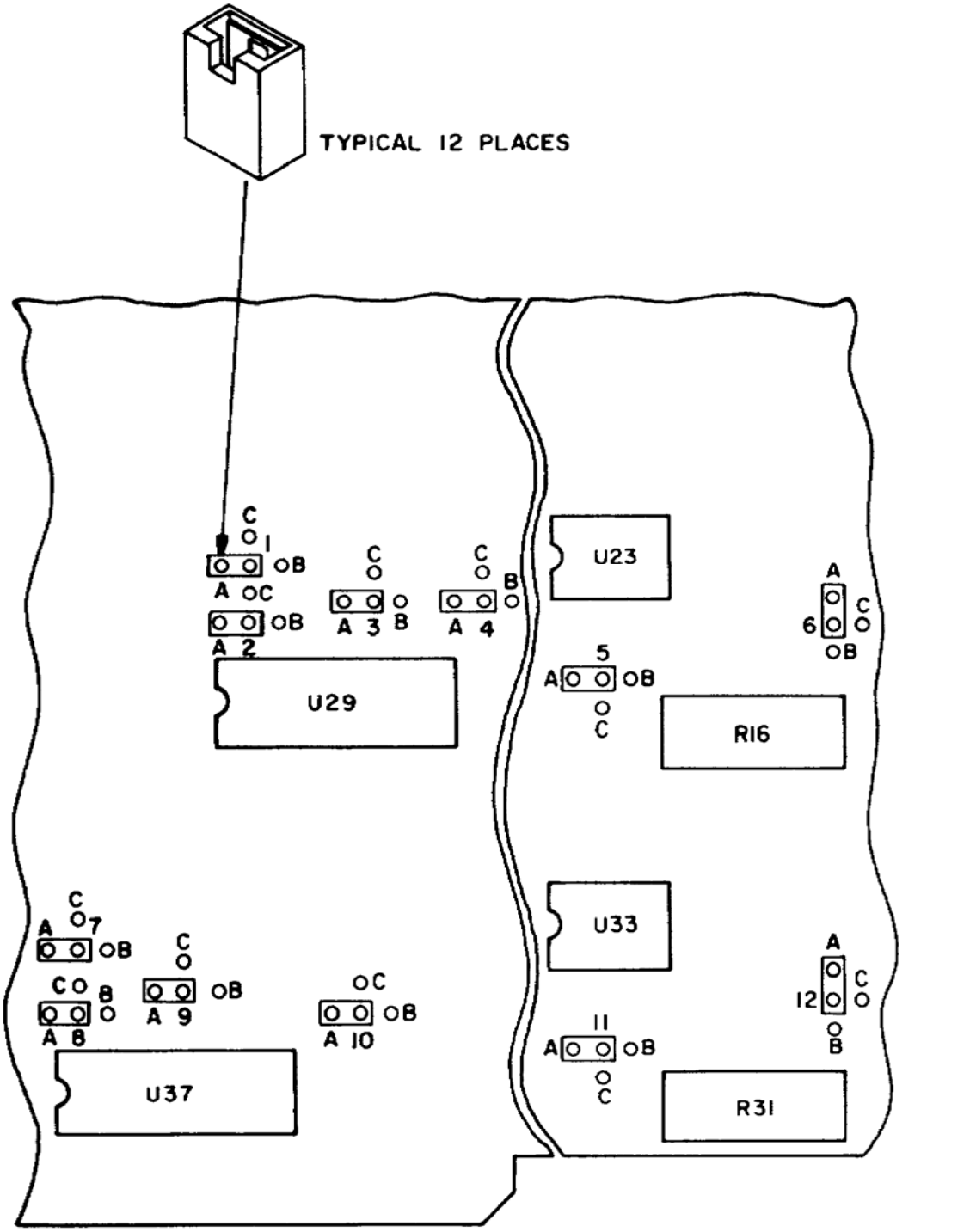



Figure 18. Shared Logic Module Strapping (A12).

This module contains six jumper straps. All jumpers must be set to A. Alternate position B is normally reserved for factory use.

d. Port carrier module (A1-A8)(see figure 15).

This module contains 12 jumper straps. Jumpers 1, 2, 3, and 4 set termination for receive data on the even port. Jumpers 5 and 6 set termination for transmit data on the even port. Jumpers 7, 8, 9, and 10 set termination for receive data on the odd port. Jumpers 11 and 12 set termination for transmit data on the odd port.




| EVEN PORT | | ODD PORT | |
|---|---|---|---|
| JUMPER 1-6 | TERMINATIONS | JUMPER 7-12 | TERMINATIONS |
| A | UNBALANCED | A | UNBALANCED |
| B | 124 OHM BALANCED | B | 124 OHM BALANCED |
| C | DIPHASE | C | DIPHASE |

Figure 19. Port Carrier Module Strapping (A1-A8).

2. Port and Aggregate Module Strapping. The synchronous port module and the synchronous NRZ aggregate modules have jumper straps. In order to remove these modules, it is necessary to remove the module access panel. It is not necessary to remove a carrier module in order to remove a port or aggregate module (see figure 15). The port module can plug into a port carrier module located in positions A1 through A8. The aggregate module plugs into the aggregate carrier module located in position A9.

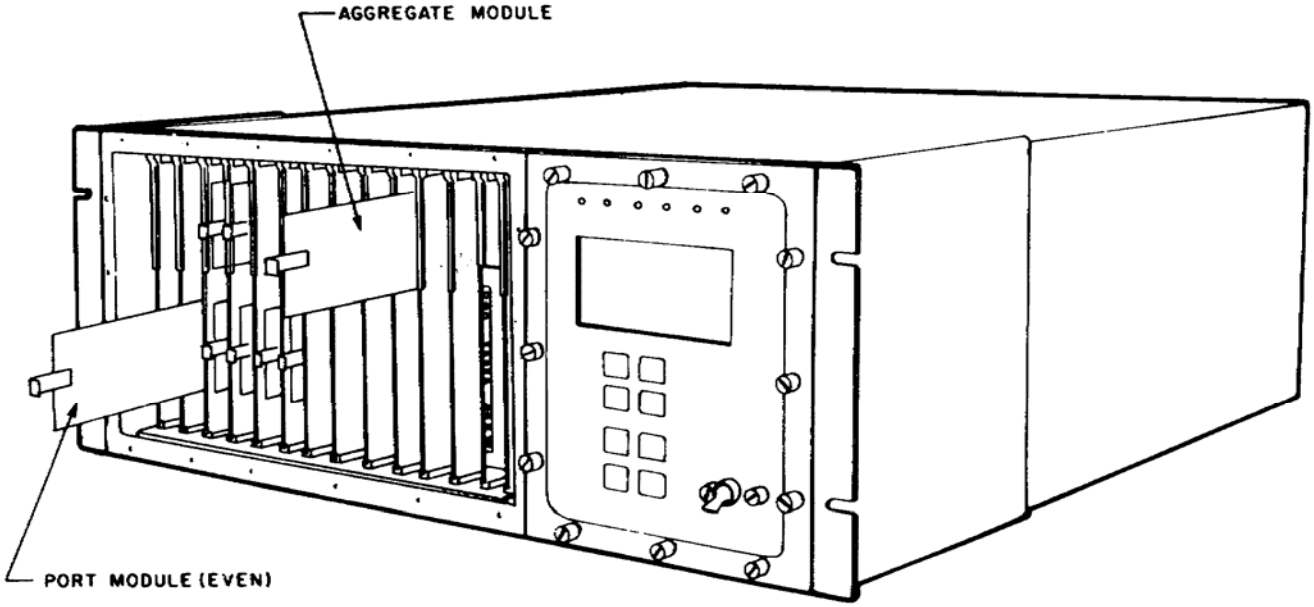



Figure 20. Port and Aggregate Module Removal.

a. Synchronous NRZ aggregate.

The synchronous NRZ requires jumper strapping to select termination for transmit and receive data, transmit clock out, and receive clock in. Jumpers 1, 3, 7, and 8 set transmit data and must be set the same. Jumpers 2, 4, 9, and 10 set transmit clock out and must be set the same. Jumper 5 sets receive data. Jumper 6 sets receive clock. Jumpers 1 through 10 are connected to either the A, B, or C termination (unbalanced or 78 or 124 ohms balanced conditions).

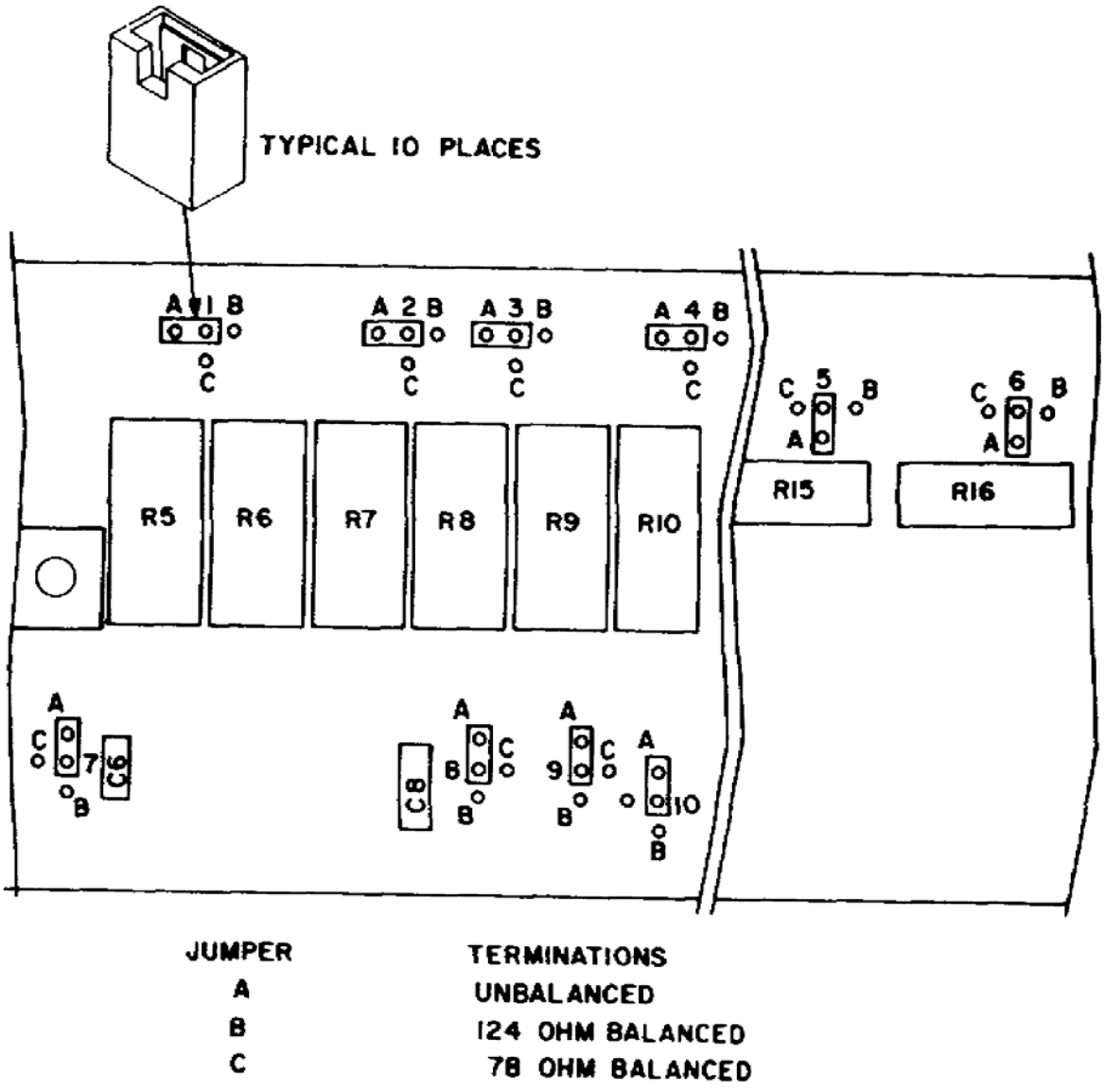



Figure 21. NRZ Aggregate Module Strapping.

b. Synchronous port.

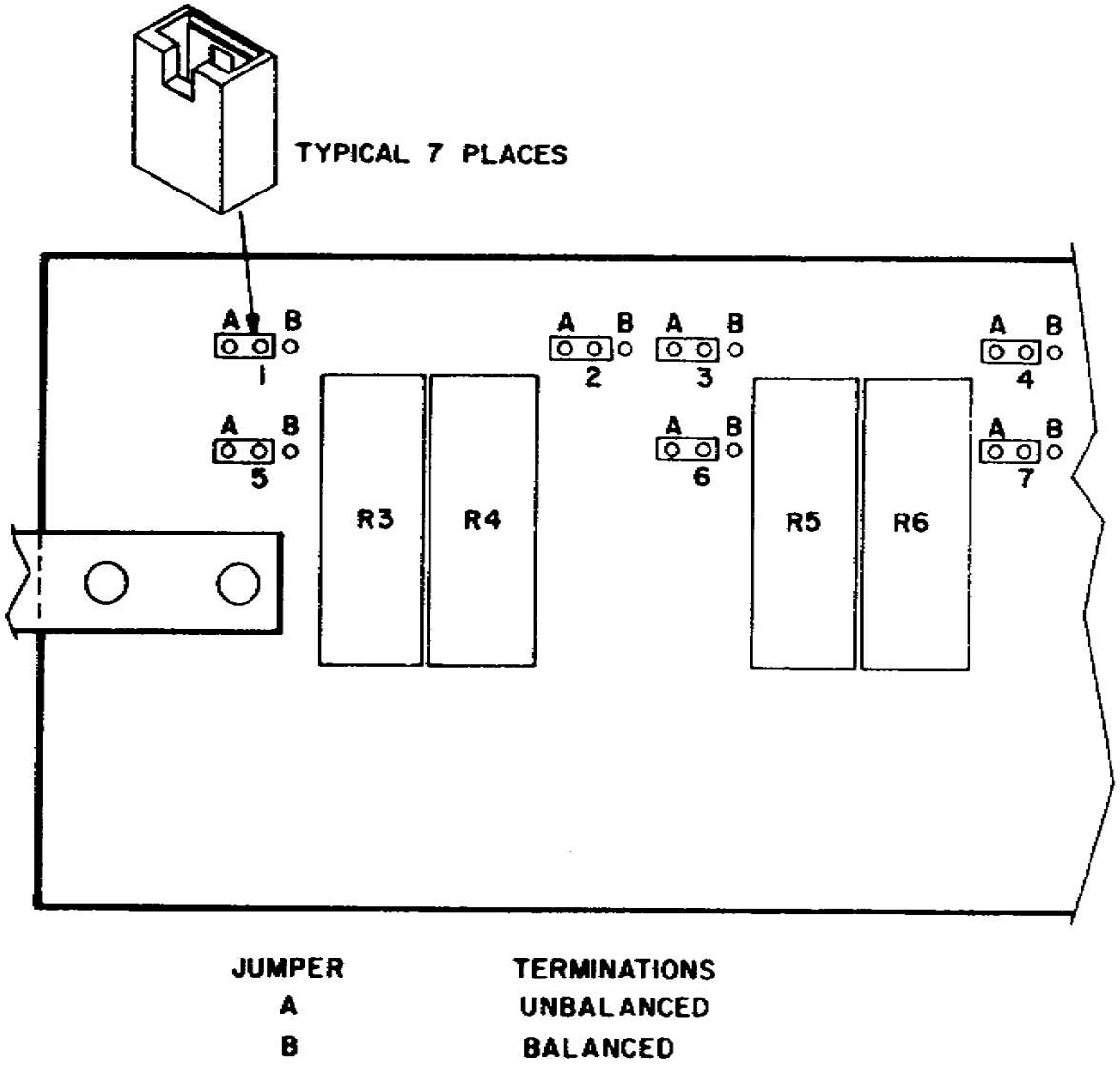



Figure 22. Synchronous Port Module Strapping.

The synchronous port module requires jumper strapping to select clock termination. Jumpers 1, 2, and 5 set transmit clock out and must be the same. Jumpers 3, 4, and 6 set receive clock and must be set the same. Jumper 7 sets transmit clock in.

LEARNING EVENT 4: Operation Under Normal Conditions.

1. General Information. Operation of the Multiplexer Set AN/FCC-100(V) consists of entering commands which selects parameters for each mode of operation. Commands can be entered from the front panel or a user provided control terminal. The operator selects the mode and enters the desired choices for that mode. Upon completion, the AN/FCC-100(V) can be returned to operation mode.

a. Front panel. The eight front panel keys permit an operator to select a mode and scroll through sets of parameters. The front panel display indicates the current mode or parameter choice. When the operator reaches the desired display, he can store this entry. The operator can then perform any other operation required. After the last entry is made, the operator can return the system to operation mode by pressing RESTART (see figure 13).

b. Control terminal. A user provided control terminal permits an operator to enter commands directly. The operator types the mode and desired parameters on the terminal keyboard. (All modes except test can be entered into from a terminal). The AN/FCC-100(V) will reply to the operator through the terminal. After the last entry is made and no additional operator input is required, the AN/FCC-100(V) will reply to the operator through the terminal. After the last entry is made and no additional input is required, the AN/FCC-100(V) automatically returns to operation mode. A control terminal provides for faster operation by permitting an operator to make entries directly.

2. Modes of Operation. There are eight modes for the AN/FCC-100(V). The primary mode is operation. In this mode, the AN/FCC-100(V) can send and receive user data without any operator intervention. Other modes permit an operator to examine, check, and store changes to the AN/FCC-100(V) operating system. Additional modes allow an operator to interrupt data traffic to perform a test or activate a change to the operating system (see foldout 1).

a. Operate. The AN/FCC-100(V) is set to send and receive data. Operation may be either normal (no errors detected) or alarm (one or more faults found).

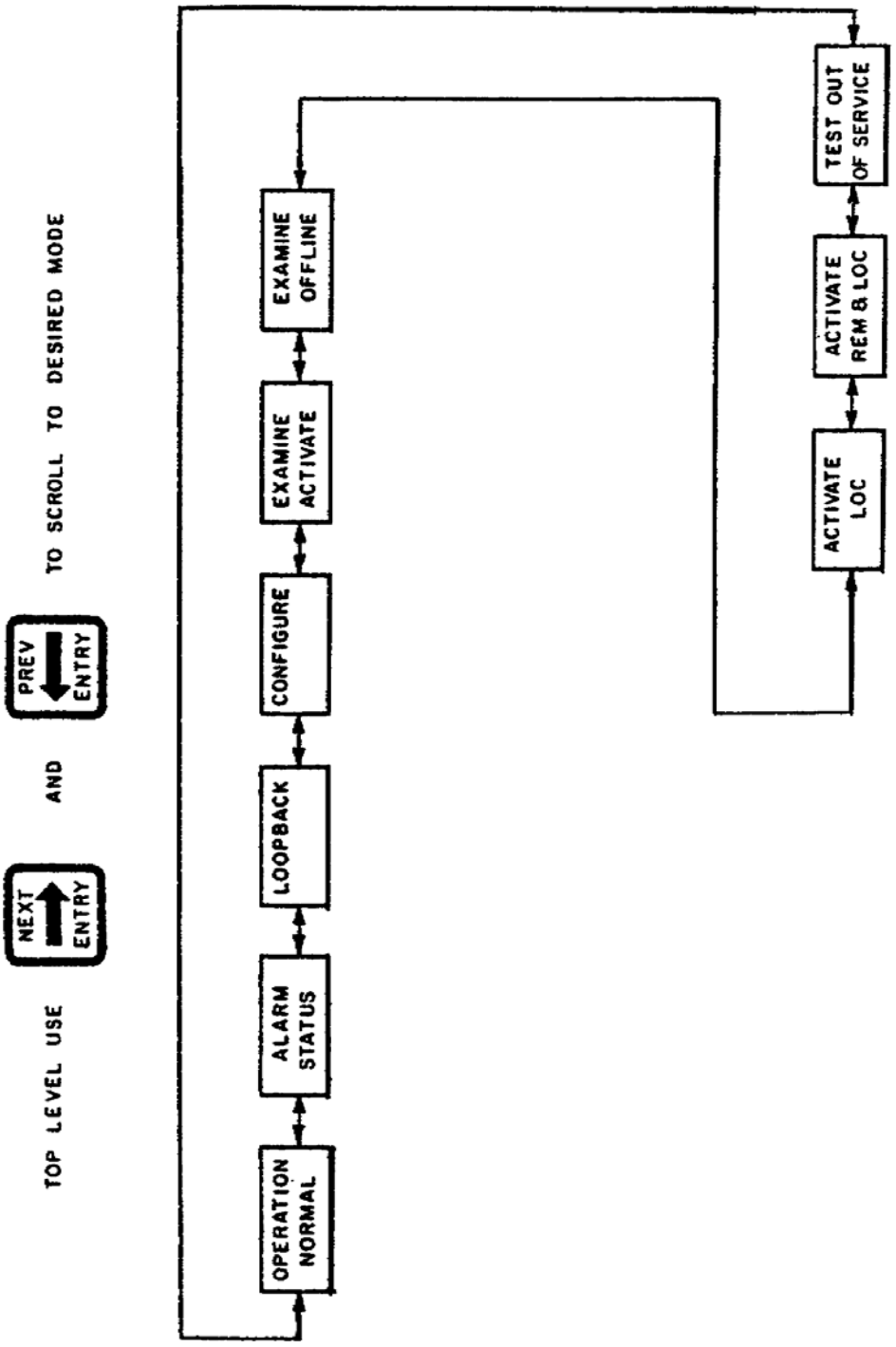



Figure 23. Modes of Operations Associated With Front Panel.

b. Alarm status. While data traffic continues, an operator can request the AN/FCC-100(V) to show which alarm conditions are present.

CAUTION: When a channel is in loopback, user data traffic is interrupted.

c. Loopback. Local aggregate loopbacks and local and remote port loopbacks can be reviewed, created, and canceled.

d. Configure. An operator can change the parameters which are currently running.

e. Examine active. An operator can inspect the parameters which are currently running.

f. Examine off line. An operator can inspect the parameters which are stored in AN/FCC-100(V) memory.

CAUTION: Activate causes a resynchronization attempt and momentarily stops user data traffic.

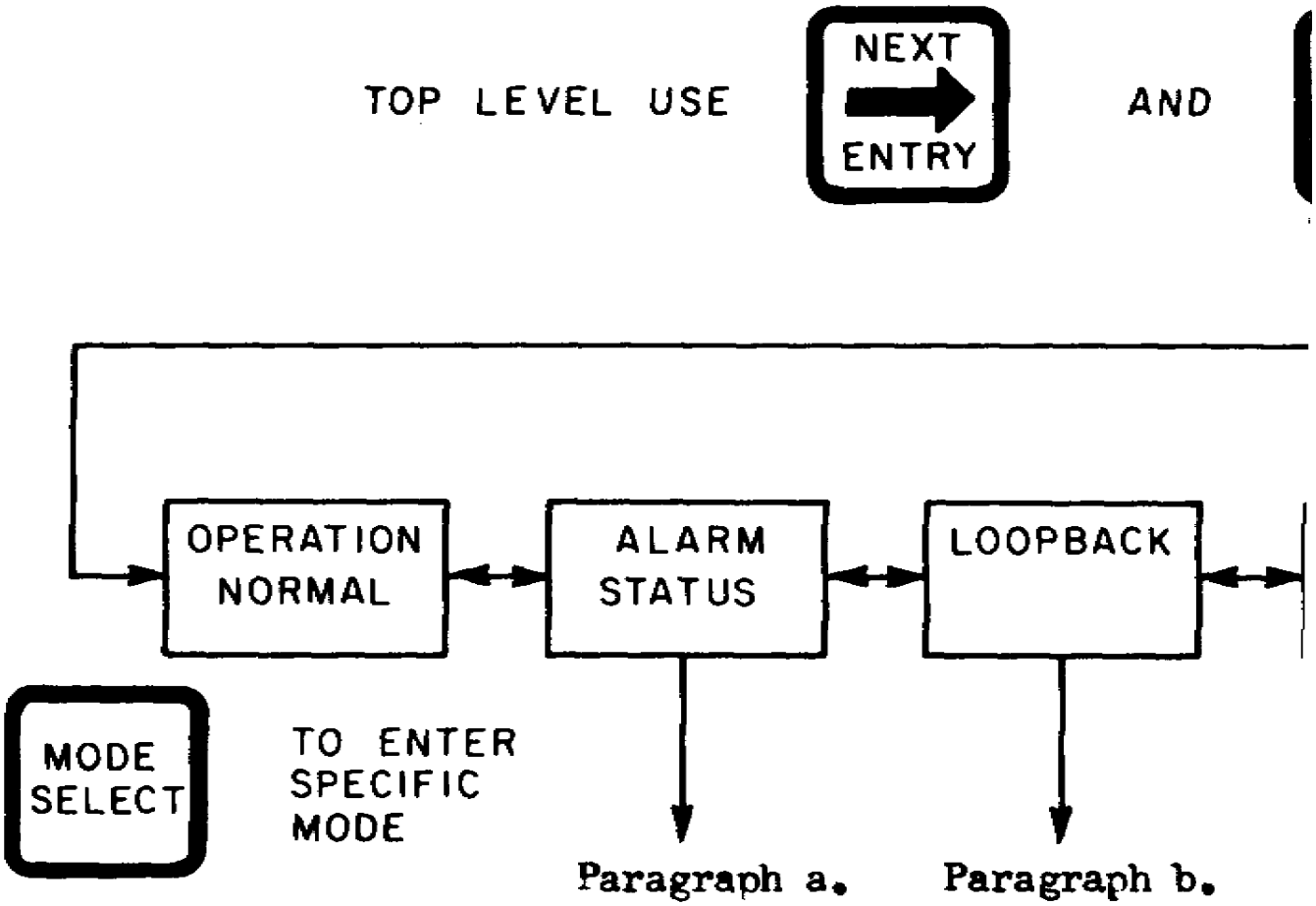
g. Activate. An operator can place the parameters stored in off-line memory into the active configuration of the AN/FCC-100(V). Parameters can be placed into the near end by activate local. Parameters can be placed into the near and far end by activate remote and local.

CAUTION: User traffic data is stopped for the duration of test.

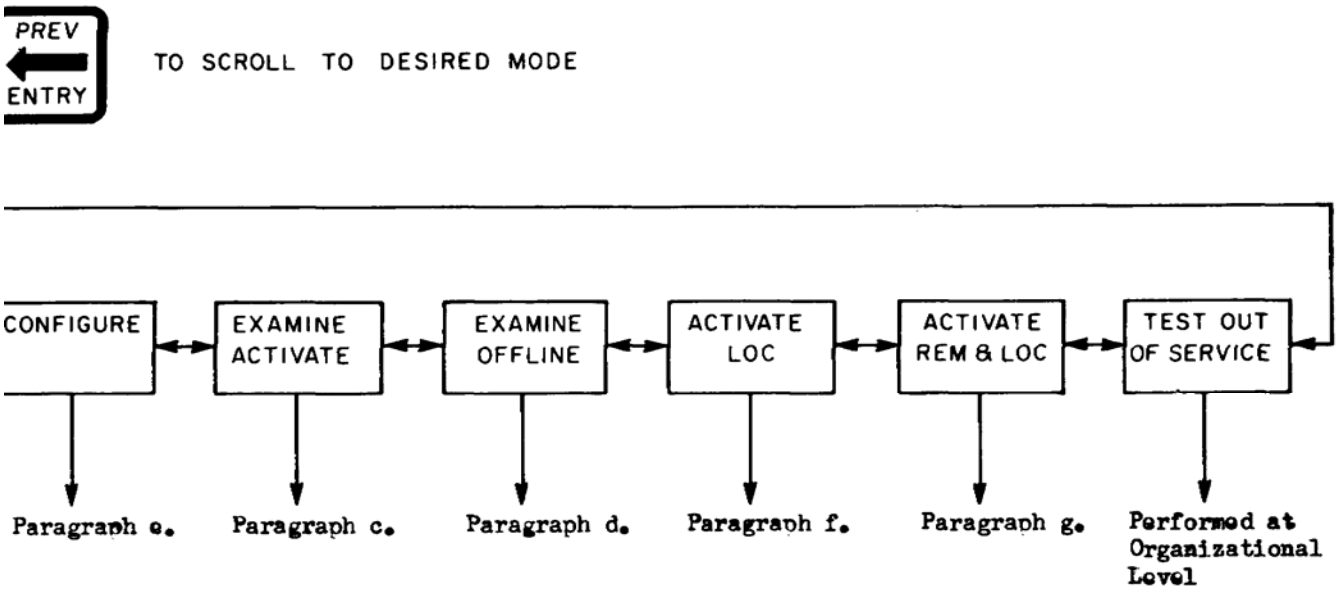
h. Test. Causes the AN/FCC-100(V) to run continuous self-test.

3. Front Panel Operation. When the front panel is used, an operator can use the NEXT ENTRY and PREV ENTRY keys to scroll through the modes (see foldout 1). When MODE SELECT is pressed, the AN/FCC-100(V) will enter the mode currently shown on the display. The next paragraphs will discuss front panel operation for each specific mode.

NOTE: The first character of a selectable line is indicated by a flashing display. In this text, the flashing character is shown by a letter preceded by a > (caret). All displays shown are typical examples. The actual displays seen will depend on the particular user network.




Foldout 1. Front Panel Operation.




Foldout 1. Front Panel Operation. Cont.

a. Alarm status.

(1) With NEXT ENTRY key, the operator scrolls to:

>ALARM
STATUS

(2) The MODE SELECT key causes the front panel to display the first error message. (If no errors are present, the display will return to the operation normal heading.) The RESTART key will return the AN/FCC-100(V) to operation mode.

(a) Ports. The NEXT ENTRY key permits the operator to scroll through the remaining error(s). The display will indicate the port(s) with a problem and either INCOMPATIBLE or PORT ERROR. INCOMPATIBLE indicates that the configuration does not match hardware. PORT ERROR indicates that either the port module or port carrier is bad.

>PORT 7
ERROR

(b) System. The NEXT ENTRY key also will show system errors. Only the first error detected will be displayed. The system errors are described in 1 through 7 below.

>SYSTEM
REPLACE AX12

1. Transmit processor error. A bad transmit processor module is indicated by REPLACE AX10.

2. Receive processor error. A bad receive processor module is indicated by REPLACE AX11.

3. Shared logic error. A bad shared logic module is indicated by replace AX12.

4. Port/aggregate error. If the total port data rate exceeds the aggregate capability, the display will indicate PORTS >AGGR.

5. Clock loss. If external clock is being used and is lost,-the display will indicate EXT CLK LOSS.

6. Module failure. If a module is bad, the display will show H/W fault.

7. Multiple faults. If two or more system faults are detected, the display will show MULTIPLE.

b. Loopback (see foldout 2).

(1) With the NEXT ENTRY key, the operator scrolls to:

>LOOPBACK

(2) With the MODE SELECT key, the operator enters loopback mode. The alphanumeric display shows:

>PORT 1
NO-LB

(3) The NEXT ENTRY key allows the operator to scroll through the possible choices; e.g., PORT 1, PORT 2, PORT 3, ..., PORT 16, AGGR, PORT 1.

>PORT 1
NO-LB

(4) The DOWN ARROW key moves the cursor to the desired line.

PORT 1
>NO-LB

(5) The NEXT ENTRY key advances through the possible choices; i.e., NO-LB (no-loopback), LOC (local loopback), and REM (remote loopback).

PORT 1
>REM

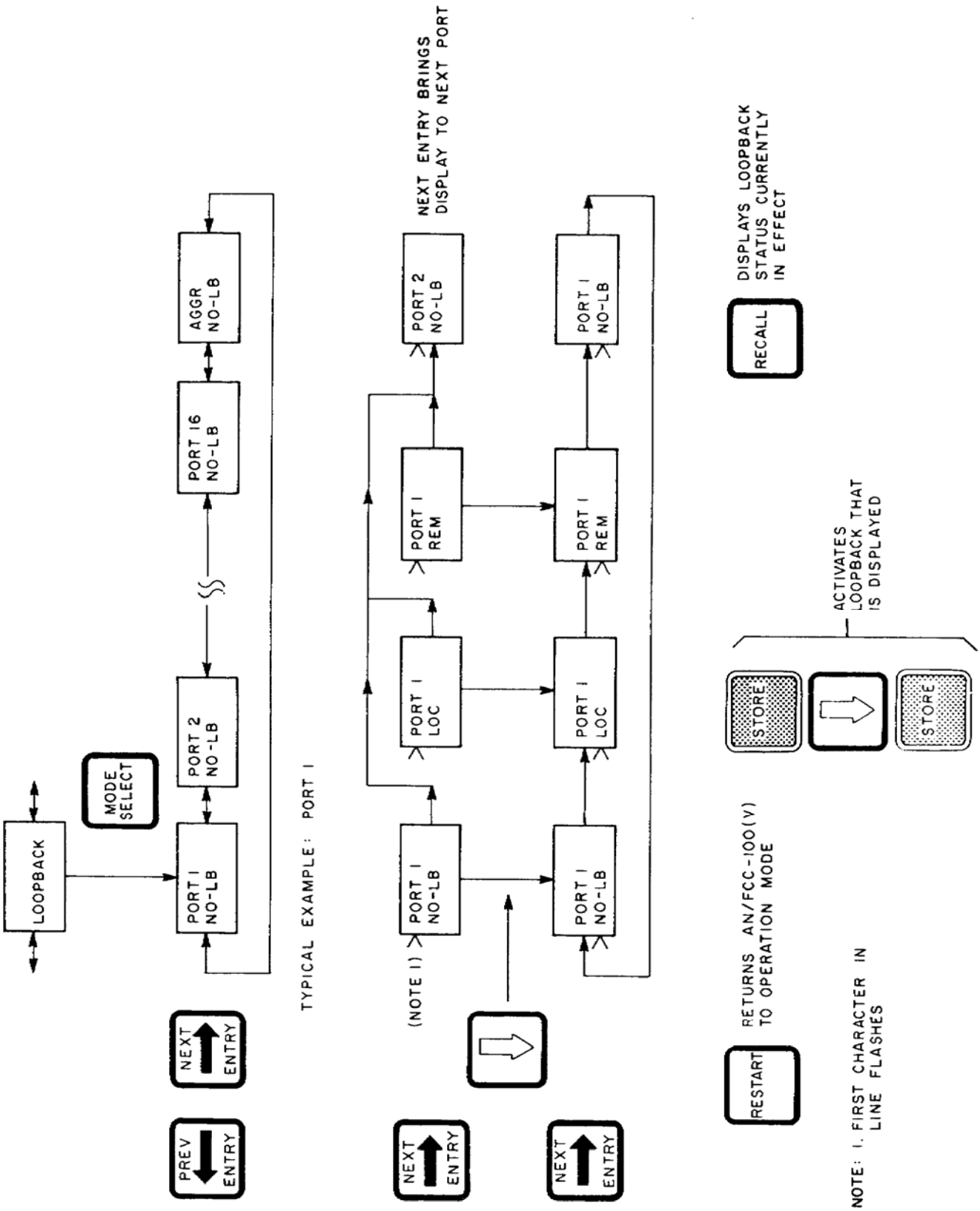
(6) The STORE key changes the display (CAUTION is flashing).

CAUTION
>LOOPBACK

(7) The down arrow changes CAUTION to steady and causes the L to flash. (This key sequence prevents an operator from accidentally entering a loopback.) The display shows:

CAUTION
>LOOPBACK

NOTE: Stop at this point, the next step will cause the loopback to be activated, interrupted traffic of port 1. If port 1 is unused, go ahead and complete the exercise; if not, select another unused port to perform this exercise. If no ports are available stop here, and go to the next portion on aggregate loopback.




Foldout 2. Front Panel Operation-Loopback.

(8) The STORE key activates the new loopback state and returns the AN/FCC-100(V) to operation mode. (If a loopback was created, the appropriate loopback light on the front panel would come on.) The RESTART key returns the AN/FCC-100(V) to operation mode without activating the new loopback. To examine or change additional loopbacks, the operator must reenter loopback mode and use the NEXT ENTRY key to advance to the next choice.

```
>PORT 14
 NO-LB AVAIL
```

(9) Port 14 is configured as a type which does not permit loopback.

(10) The NEXT ENTRY key advances the display to the next choice.

```
>AGGR
 NO-LB
```

(11) The DOWN ARROW key moves the cursor to the desired line.

```
 AGGR
>NO-LB
```

(12) The next entry scrolls through the list of possible choices; e.g., NO-LB (no loopback), LOC (local loopback). To activate the new loopback press STORE, the DOWN ARROW key, and STORE. The AN/FCC-100(V) returns to operation mode. The RESTART key returns the display to operation mode without activating a new loopback.

NOTE: Do not activate an aggregate loopback. If aggregate loopback is activated, you will break complete traffic with the distant end.

c. Examine active.

(1) With the NEXT ENTRY key, the operator scrolls to:

```
>EXAMINE
 ACTIVATE
```

(2) With the MODE SELECT key, the operator enters examine active mode. The alphanumeric display shows the port 1 parameters.

```
>PORT 1       NO-LB
 SYN          1200
```

The above display shows loopback condition, port type, and port rate. In this example, port 1 is synchronous at 1200 baud with no loopback. With the down arrow, the operator can examine the remaining port 1 parameters.

```
POS-MARK
INT-CLOCK
```

The above display shows mark sense and clock source. In this example, port 1 employs positive mark and an internal clock. No cursor is present since neither parameter may be changed. The operator must return to page 1 by either the down arrow or up arrow key to scroll to the remaining ports, aggregate, and system. The NEXT ENTRY key allows the operator to scroll through the remaining ports, 2 through 16. For an unused port, the front panel would show:

```
>PORT 16
 UNUSED
```

(3) Once all the ports are examined, the NEXT ENTRY key will cause the aggregate parameters to be displayed.

```
>AGGR   NO-LB
 NRZ 32K
```

The DOWN ARROW key will advance the display to the next page.

```
POS-MARK
INT-CLOCK
```

After returning to page 1, the operator can scroll to system.
The display becomes:

```
>SYSTEM
 BUF 128 FRAME 1
```

There is no page 2 for system parameters. The NEXT ENTRY (->) key returns the display to port 1. At any time, the RESTART key will return the front panel to the operation mode.

d. Examine off line.

(1) With the NEXT ENTRY key, the operator scrolls to:

```
>EXAMINE
 OFF LINE
```

(2) With the MODE SELECT key, the operator enters examine off-line mode. The alphanumeric display shows the port 1 parameters.

```
>PORT 1       NO-LB
 SYN  1200
```

(3) The above display shows loopback condition, port type, and port rate. In this example, port 1 is synchronous at 1200 baud with no loopback. With the DOWN ARROW key, the operator can examine the remaining port 1 parameters.

```
POS-MARK
INT-CLOCK
```

(4) The above display shows mark sense and clock sense. In this example, port 1 employs positive mark and an internal clock. No cursor is present since neither parameter may be changed. The operator must return to page 1 via either the DOWN ARROW or UP ARROW key to scroll to the remaining ports, aggregate, and system. The NEXT ENTRY key allows the operator to scroll to the remaining ports, 2 through 16. For an unused port, the front panel would show:

```
>PORT 16
 UNUSED
```

(5) Once all the ports are examined, the NEXT ENTRY key will cause the aggregate parameters to be displayed.

```
>AGGR    NO-LB
 NRZ   32K
```

(6) The DOWN ARROW key will advance the display to the next page.

```
POS-MARK
INT-CLOCK
```

(7) After returning to page 1, the operator can continue to scroll to system. The display becomes:

```
>SYSTEM
 BUF 128 FRAME 1
```

(8) There is no page 2 for system parameters. The NEXT ENTRY key returns the display to port 1. At any time, the RESTART key will return the front panel to the operation mode.

e. Configure (see foldout 3-1 and foldout 3-2).

NOTE: This mode of operation will only be performed if there is an unused port available.

(1) With the NEXT ENTRY key, the operator scrolls to:

```
>CONFIGURE
```

(2) With the MODE SELECT key, the operator enters the configure mode. The alphanumeric display shows:

```
>PORT 1
 SYN
```

(3) The NEXT ENTRY key allows the operator to scroll through the possible choices; e.g., PORT 1, PORT 2, PORT 3, ..., PORT 16, AGGR, SYSTEM, PORT 1, etc. When the operator reaches the desired choice, the DOWN ARROW key moves the cursor to the next line. For example:

```
 PORT 1
>SYN
```

(4) The operator can now use the NEXT ENTRY key to select one of the following port types: DIPHASE, SYN, ISO, ISO/SYN, SYN/ISO, ASY, CVS, CVS/SYN, SYN/CVS, PCM, PCM/SYN, SYN/PCM, and UNUSED. After the port type has been selected, the operator uses the DOWN ARROW key to advance to the next line. This line contains the port loopback type.

```
 PORT 1
>NO-LB
```

(5) The operator can now select, using the NEXT ENTRY key, the port loopback type. The types are NO-LB (port is not in loopback), LOC (port is in local loopback), and REM (port is in remote loopback). After the port loopback has been selected, the operator uses the DOWN ARROW key to advance to the next line. This line contains the port rate.

```
 PORT 1
>1200
```

(6) The operator can now select, using the NEXT ENTRY key, the port rates. Only certain rates are available for some port types (refer to table I, GTA 11-10-32). The port rates are 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 8000, 9600, 16K, 19.2K, 32K, 64K, <75, <150, <300, <600, <1200, and <2400. After the port rate has been selected, the operator uses the DOWN ARROW key to advance to the next line.
This line contains the port mark sense.

```
 PORT 1
>POS-MARK
```

(7) The operator can now select, using the NEXT ENTRY key, the port mark sense. The mark sense types are POS-MARK, and NEG-MARK. After the port mark sense has been selected, the operator uses the DOWN ARROW key to advance to the next line.
This line contains the port clock source.

```
 PORT 1
>INT-CLOCK
```

(8) The operator can now select, using the NEXT ENTRY key, the port clock source. The sources are INT-CLOCK (internal clock source), and EXT-CLOCK (external clock source). The DOWN ARROW key will now cause the display to return to the first port parameter choice. At any time during port configuration, the UP ARROW key will return the display to the first line of the parameter page of the port being configured. At any time during port configuration, the STORE key will place the new parameter choices in AN/FCC-100(V) off-line memory. The RECALL key will return any changed parameters back to the state which is currently stored in off-line memory, provided the STORE key has not been pressed. Once the STORE key has been pressed, the display becomes:

```
>PORT 1
 SYN
```

(9) The NEXT ENTRY key allows the operator to scroll through the remaining ports. When the operator reaches the next desired port, the DOWN ARROW key moves the cursor to the next line.

```
 PORT 12
>SYN
```

(10) The operator can now select, using the NEXT ENTRY key, a port type. For example, if asynchronous is selected, the display will show:

```
 PORT 12
>ASY
```

(11) After the port type has been selected, the operator uses the DOWN ARROW key to the next line. This line contains the port loopback type.

```
 PORT 12
>NO-LB
```

(12) The operator can now select, using the NEXT ENTRY key, a valid port loopback type. After the port loopback has been selected, the operator uses the DOWN ARROW key to advance to the next line. This line contains the port rate.

```
 PORT 12
>1200
```

(13) The operator can now select, using the NEXT ENTRY key, a valid port rate (refer to table I, GTA 11-10-32). After the port rate has been selected, the operator uses the DOWN ARROW key to advance to the next line. This line contains the port mark sense.

```
 PORT 12
>POS-MARK
```

(14) The operator can now select, using the NEXT ENTRY key, a valid port rate. After the port rate has been selected, the operator uses the DOWN ARROW key to advance to the next line. This line contains the number of data bits per character.

```
 PORT 12
>8
```

(15) The operator can now select, using the NEXT ENTRY key, the number of data bits required. The possible choices are 5, 6, 7, and 8. After the number of data bits has been selected, the operator uses the DOWN ARROW key to advance to the next line. This line contains number of stop bits.

```
 PORT 12
>1
```

(16) The operator can now select, using the NEXT ENTRY key, the number of stop bits required. The choices are 1, 2. (For 5-bit data, a choice of 2 will become 1.5 stop bits in the data stream.) The DOWN ARROW key will now cause the display to return to the first port parameter choice. Once all port configurations have been selected and stored, the NEXT ENTRY key will bring the operator to the aggregate parameters.

```
>AGGR
 NRZ
```

(17) The DOWN ARROW key advances to the next line. The operator can now select, using the NEXT ENTRY key, the aggregate types (refer to table II, GTA 11-10-32). The types are diphase and NRZ. After the aggregate type has been selected, the operator uses the DOWN ARROW key to advance to the next line. This line contains the AGGREGATE loopback type.

```
 AGGR
>LOC
```

(18) The operator can now select, using the NEXT ENTRY key, the loopback type for the aggregate. The choices are NO-LB and LOC. After the loopback type has been selected, the operator uses the DOWN ARROW key to advance to the next line. This line contains the aggregate rate.

```
 AGGR
>9600
```

(19) The operator can now select, using the NEXT ENTRY key, the aggregate rate. Only certain rates are available for each aggregate type (refer to table II, GTA 11-10-32). The rates are 1200, 2400, 4800, 9600, 16K, 32K, 50K, 56K, 64K, 128K, 192K, and 156K. Next the operator selects, using the NEXT ENTRY key, the mark sense type.

```
 AGGR
>POS-MARK
```

(20) The choices are POS-MARK and NEG-MARK. After the aggregate mark space has been selected, the operator uses the DOWN ARROW key to advance to the next line. This line contains the aggregate clock source.

```
 AGGR
>INT-CLOCK
```

(21) The operator can now select, using the NEXT ENTRY key, the following clock sources. The choices are INT-CLOCK (internal clock source), EXT-CLOCK (external clock source), and REC-CLOCK (receive clock). The DOWN ARROW key will now cause the display to return to the first aggregate parameter choice.

(22) At any time during aggregate configuration, the UP ARROW key will return the display to the first line of the aggregate parameter page. Once all aggregate parameters have been selected and stored, the NEXT ENTRY key will bring the operator to the system parameters.

```
>SYSTEM
 BUF0
```

(23) Using the DOWN ARROW key, the operator advances to the next line.

```
 SYSTEM
>BUFO
```

(24) The operator can now select, using the NEXT ENTRY key, the buffer sizes. The choices are 0, 4, 8, 16, 32, 64, and 128. After the buffer size has been selected, the operator uses the DOWN ARROW key to advance to the next line. The line contains the system synchronization word.

```
 SYSTEM
>FRAME 1
```

(25) The operator can now select, using the NEXT ENTRY key, one of the synchronization words. The choices are FRAME 1 and FRAME 2. The DOWN ARROW key will now cause the display to return to the first system parameter choice. At any time during system configuration, the up arrow will return the display to the first line of the system parameter page. At any time, the RESTART key will return the display to operation mode. The display will show:

```
OPERATION
NORMAL
```

NOTE: The next two modes are to be used only if unused port(s) are available. Any activation process will only be performed by authorized and qualified personnel.

f. Activate local.

(1) With the NEXT ENTRY key, the operator scrolls to:

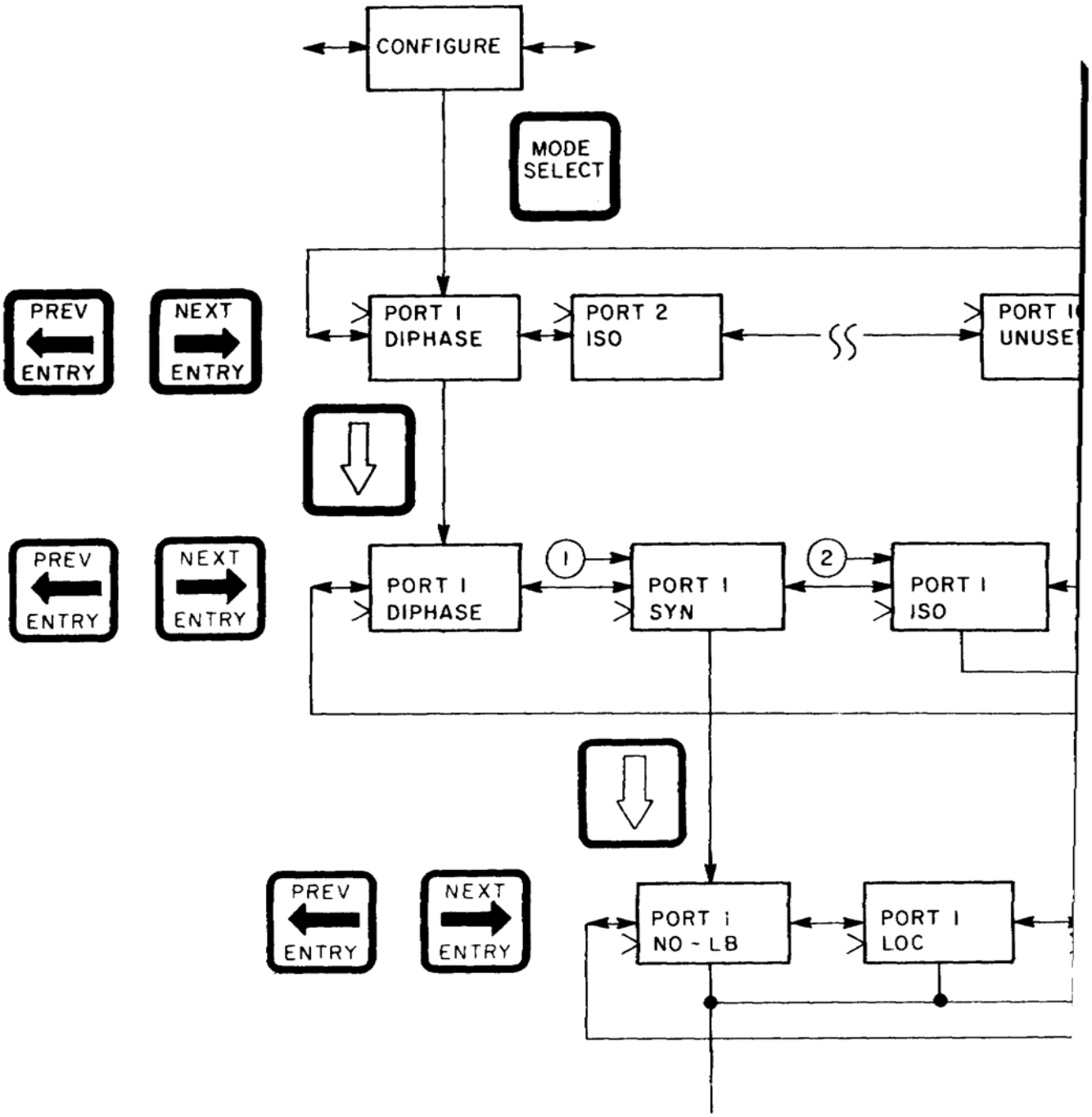
```
 ACTIVATE
>LOC
```

(2) With the MODE SELECT key, the operator enters activate local mode. The alphanumeric display shows CAUTION flashing.

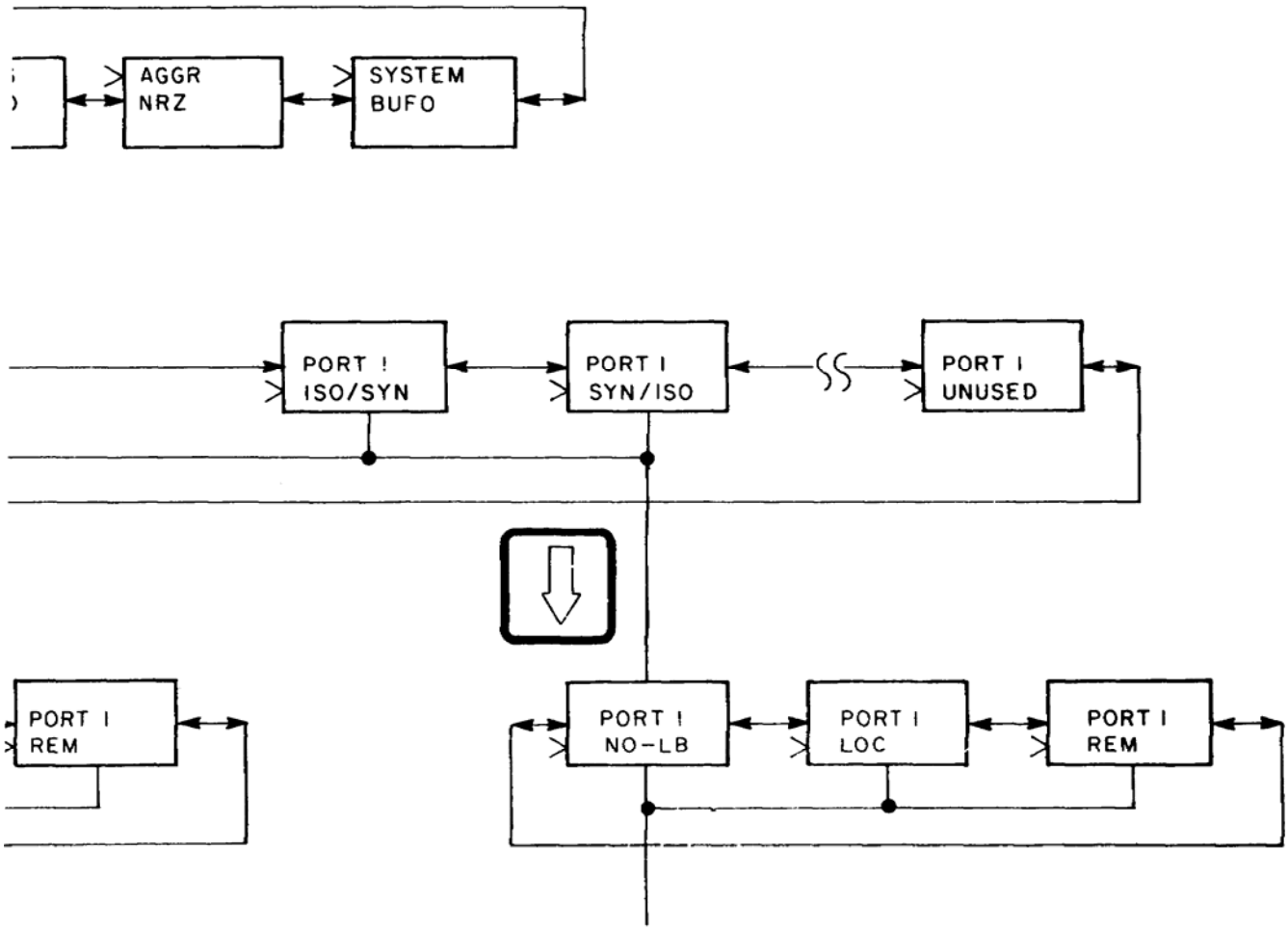
```
CAUTION
ACTIVATE
```

(3) The DOWN ARROW key moves the cursor to the next line.

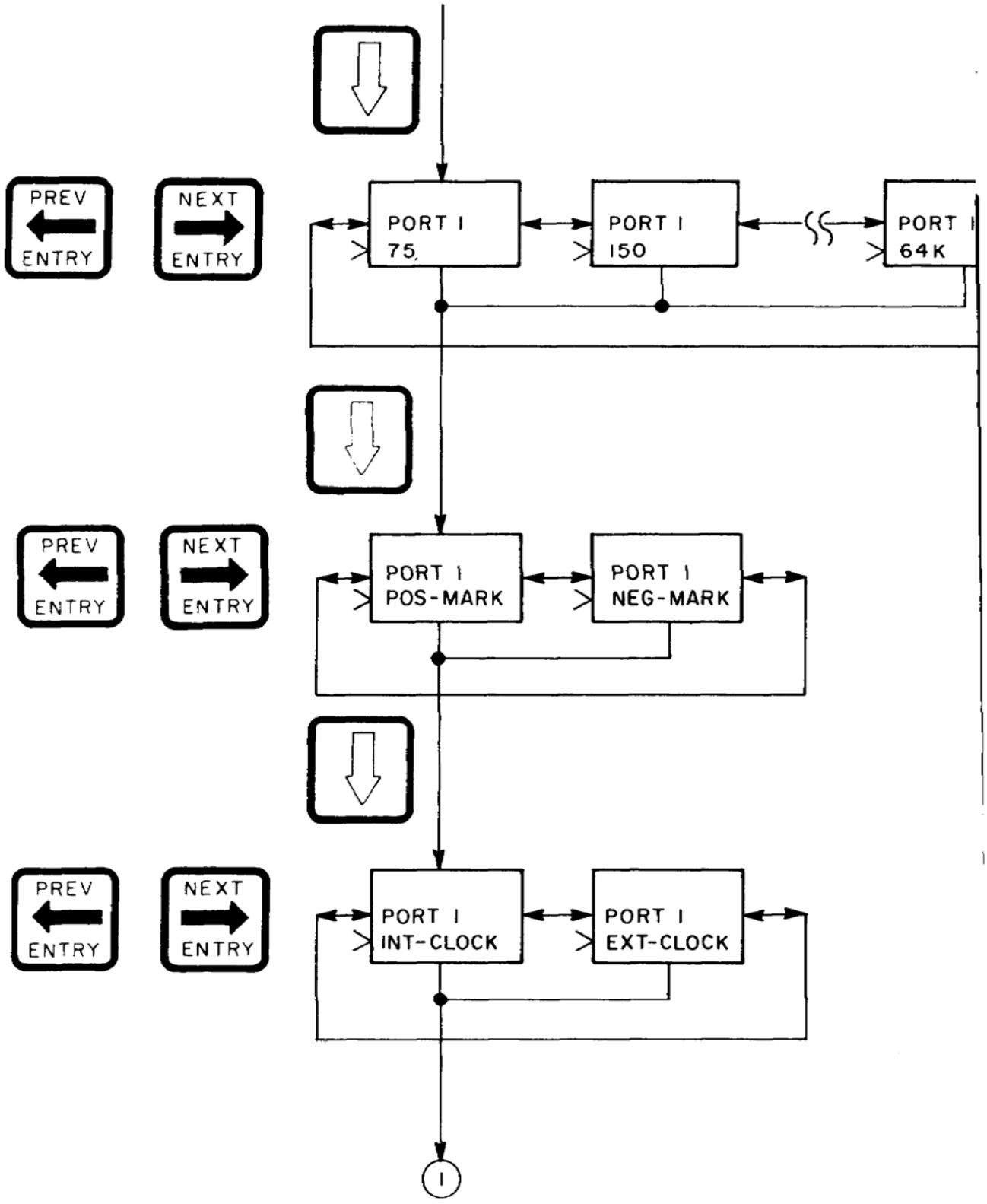
```
 CAUTION
>ACTIVATE
```



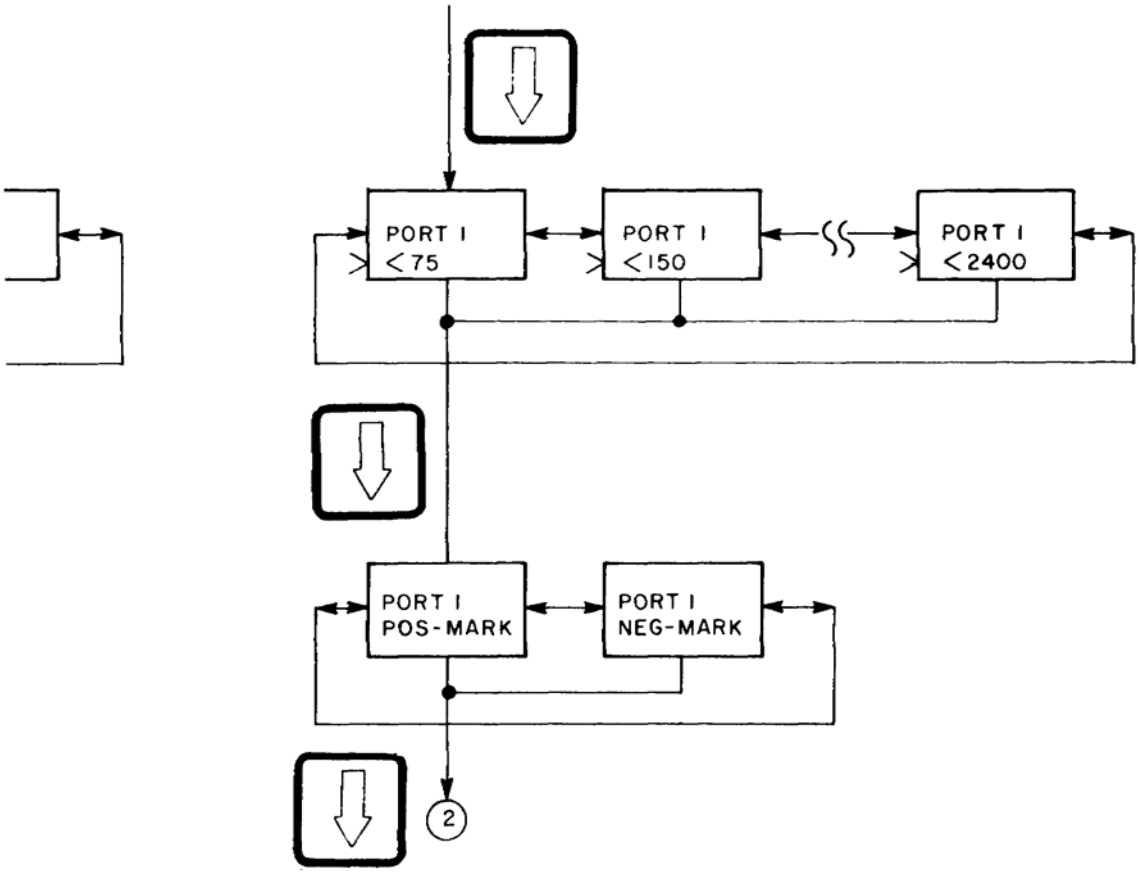

Foldout 3-1. Front Panel Operation-Configure.




Foldout 3-1. Front Panel Operation-Configure (Cont).




Foldout 3-2. Front Panel Operation-Configure (Cont).




STORE

AT ANY TIME DURING PORT CONFIGURATION, THE STORE KEY WILL PLACE THE NEW PARAMETER CHOICES IN AN/FCC-100(V) OFFLINE MEMORY. THE DISPLAY WILL RETURN TO THE FIRST LINE OF THE PARAMETER PAGE OF THE PORT BEING CONFIGURED.

RECALL

THE RECALL KEY WILL RETURN ANY CHANGED PARAMETERS BACK TO THE STATE WHICH IS CURRENTLY STORED IN OFFLINE MEMORY, PROVIDED THE STORE KEY HAS NOT BEEN DEPRESSED.

AT ANY TIME DURING PORT CONFIGURATION, THE ⇧ KEY WILL RETURN THE DISPLAY TO THE FIRST LINE OF THE PARAMETER PAGE OF THE PORT BEING CONFIGURED.

RESTART

AT ANY TIME DURING PORT CONFIGURATION, THE RESTART KEY WILL RETURN THE DISPLAY TO OPERATION MODE

Foldout 3-2. Front Panel Operation-Configure (Cont).

CAUTION: Pressing the STORE key momentarily stops user data traffic. Activate changes the running configuration and could result in compatibility between the local and remote AN/FCC-100(V) s.

(4) The STORE key causes the AN/FCC-100(V) to place the off-line configuration on line. This key also causes the system to attempt resynchronization. The display will show:

>OPERATION
NORMAL

(5) During this time the system is not passing user data. Once resynchronization has been completed, the system will automatically start passing user data.

g. Activate remote and local.

(1) With the NEXT ENTRY key, the operator scrolls to:

>ACTIVATE
REM & LOC

(2) With the MODE SELECT key, the operator enters activate remote and local mode. The alphanumeric display shows CAUTION flashing.

CAUTION
ACTIVATE

(3) The DOWN ARROW key moves the cursor to the next line.

CAUTION
>ACTIVATE

CAUTION: Pressing the STORE key momentarily stops user data traffic. Activate changes the running configuration and could result in incompatibility between the local and remote AN/FCC-100(V) s.

(4) The STORE key causes the AN/FCC-100(V) to place the off-line configuration to the remote AN/FCC-100(V). Next, the on-line configuration is placed on line in the local AN/FCC-100(V). Finally, both AN/FCC-100(V) s attempt resynchronization. The display will show:

>OPERATION
NORMAL

(5) During this time, the system is not passing user data. Once resynchronization has been completed, the system will automatically start passing user data.

h. Control terminal operation. A control terminal may be used to perform such operations as ACTIVATE, STATUS, EXAMINE, CONFIGURE, and LOOPBACK.

NOTE: For more instructions on how to use a control terminal in conjunction with the AN/FCC-100(V), consult paragraphs 3-13 through 3-19, section II, chapter 3, TM 11-5805-732-12.

i. Test out of service. This mode of operation will be performed only at organizational level maintenance by authorized and qualified personnel only, during a troubleshooting process. This test enables the troubleshooter to isolate internal problem(s) of the AN/FCC-100(V). This test is also called the BITE check. A BITE check takes the AN/FCC-100(V) out of service and stops user data communication.

LESSON VERIFICATION 2

INSTRUCTIONS TO STUDENT:

This is a self-graded exercise to help you determine the knowledge acquired at this point of your training. This lesson verification is divided into two sections. Section 1 is composed of five multiple-choice questions and four true/false questions and a configuration problem. Section 2, which is performance oriented, includes module strapping and performance of three modes of operation. There is no time limit for the completion of this exercise, but close supervision is required prior to starting section 2, and during the performance of the strapping and modes of operation. All the areas of this exercise must be mastered before you can proceed to the next lesson. Using the answer sheet located at the end of lesson 2 as reference, return to the paragraph or page indicated to review weak areas, if any. At the completion of lesson verification 2, have your supervisor initial your completed work before proceeding to lesson 3. To complete this exercise, you are authorized to use this subcourse and GTA 11-10-32. You will require pencil and paper to complete portions of this exercise. Have your supervisor read the next paragraph.

INSTRUCTIONS TO SUPERVISOR:

You, the supervisor, will insure that the service member has access to an operational AN/FCC-100(V) in order to complete this lesson exercise. None of the hands-on modes of operation required to perform will break data traffic. Nevertheless, your presence is a must to prevent any communications break to occur. The individual is authorized the use of pencil, paper, GTA 11-10-32, SOJT Extract, spare of each, port carrier, aggregate carrier module, and an operational AN/FCC-100(V). After the service member completes lesson verification 2, initial where indicated and have him proceed to lesson 3.

SECTION 1

1. What are the three types of port modules available?

   a. Diphase, PCM, CVS

   b. Diphase, synchronous, isochronous

   c. Diphase, synchronous, PCM

   d. Asynchronous, isochronous, diphase

2. The STORE control on the front panel is used to

   a. present AN/FCC-100(V) operational data to the operator.

   b. advance the display to the next choice within a field.

   c. Place currently displayed parameters into off-line memory and direct the AN/FCC-100(V) to perform a command.

   d. erase the off-line memory.

3. If a port type is isochronous, and its rate is <2400, what bandwidth value must be selected to match the port rate?

   a. <75

   b. 8000

   c. 9600

   d. 16 K

4. There are eight modes of operation for the AN/FCC-100(V). These are four of them:

   a. configure, alarm status, examine off-line, loopback.

   b. configure, display, cancel, recall.

   c. loopback, restart, previous entry, test out of service.

   d. activate REM and local, mode select, recall, restart.

5. When selecting the overhead bandwidth, you must reference to GTA 11-10-32

   a. table IIIC

   b. table I

   c. table II

   d. table IIIB

Circle the correct answer.

6. The eight front panel keys permit an operator to select a mode and scroll through sets of parameters.

   TRUE FALSE

7. The aggregate carrier module contains eight straps.

TRUE FALSE

8. The port carrier module contains 12 jumper straps. Jumper 10 sets termination for receive data on the odd port.

TRUE FALSE

9. While data traffic continues, an operator can request the AN/FCC-100(V) to show which alarm conditions are present.

TRUE FALSE

10. Calculate the aggregate required to support this particular port mix (refer to GTA 11-10-32).

| Port | Type | Rates |
|---|---|---|
| 1 | Isochronous | <75 |
| 2 | Isochronous | <150 |
| 3 | Synchronous | 150 |
| 4 | Synchronous | 600 |
| 5 | Diphase | 1200 |
| 6 | Isochronous | <300 |
| 7 | Diphase | 600 |
| 8 | Synchronous | 75 |
| 9 | Isochronous | <1200 |

SECTION 2

1. Strap the port carrier module for field operation, and have supervisor inspect complete work.

2. Strap the aggregate carrier module for 124-ohm balanced, and have supervisor inspect work.

3. Perform an alarm status check, using the front panel of the AN/FCC-100(V), then report condition(s) to supervisor.

4. Perform an examine off-line operation, using the front panel of the AN/FCC-100(V). Write down on a piece of paper the data retrieved and have supervisor verify it.

5. Perform the following configuration of the AN/FCC-100(V), entering all given data on the off-line memory only. Select an unused port for this operation. PORT SYN, LOC, 1200, POS-MARK, INT CLOCK.

NOTE: After you have completed this exercise have your supervisor initial your completed work, and proceed to lesson 3.

SUPERVISOR'S INITIALS: _____

KEY ANSWER SHEET FOR LESSON VERIFICATION 2

SECTION 1

1. b, paragraph 1a, b, c, learning event 1.
2. c, paragraph 3, learning event 1.
3. d, table I, GTA 11-10-32.
4. a, figure 22, learning event 3.
5. a, table C, GTA 11-10-32.
6. True, paragraph 1a, learning event 4.
7. False, paragraph 1b, learning event 3.
8. True, paragraph 1d, learning event 3.
9. True, paragraph 2b, learning event 4.
10.

| Port | Type | Rates | Bandwidth |
|---|---|---|---|
| 1 | ISO | <75 | 300 |
| 2 | ISO | <150 | 600 |
| 6 | ISO | <300 | 1200 |
| 9 | ISO | <1200* | 4800 |
| Total | | 1725 | 6900 |

| Port | Type | Rates | Bandwidth |
|---|---|---|---|
| 3 | SYN | 150 | 150 |
| 4 | SYN | 600 | 600 |
| 5 | DI | 1200 | 1200 |
| 7 | DI | 600 | 600 |
| 8 | SYN | 75 | 75 |
| Total | | 2625 | 2625 |

The overhead bandwidth of 9525 will be the same as for 9600:400.

*When an ISO port has rate of 1200, the aggregate rate must be no less than 16K.

| | |
|---|---|
| Total isochronous ports | 6900 |
| Total synchronous & diphase ports | 2625 |
| Overhead | 400 |
| Total | 9925 |

Since 9925 is greater than 9600, a greater aggregate value must be used. Therefore, 16K becomes the correct aggregate value required.

SECTION 2

1. Refer to strapping of port carrier module, learning event 3.

2. Refer to strapping of aggregate carrier module, learning event 3.

3. Refer to paragraph 3a, learning event 4.

4. Refer to paragraph 3d, learning event 4.

5. Refer to paragraph 3c, learning event 4.

LESSON 3

OPERATOR'S MAINTENANCE INSTRUCTIONS

Task: Troubleshoot Multiplexer Set AN/FCC-100(V).

Conditions: Given some malfunction symptoms, a troubleshooting flow chart, and SOJT Extract.

Standard: Troubleshoot accurately two out of three problems, in accordance with lesson 3, within a 20-minute time limit per problem.

Reference: TM 11-5805-732-12

LEARNING EVENT 1: Tools and Equipment Required.

No tools are required. All corrective actions are performed through the front panel or control terminal.

LEARNING EVENT 2: Preventive Maintenance Checks and Services (PMCS).

No operator checks or services are required. The Multiplexer Set AN/FCC-100(V) continuously performs self-monitoring automatically. Should any malfunction be detected, refer to learning event 3.

LEARNING EVENT 3: Troubleshoot Multiplexer Set AN/FCC-100(V).

CAUTION: Troubleshooting could interrupt data traffic.

1. Troubleshooting. Operator troubleshooting will be restricted to the isolation of malfunctions through the use of loopbacks, identifying faulty operations, and diagnosing fault indications. Any problem that is beyond the scope of the operator will be referred to organizational maintenance personnel.

a. Loopbacks. Should transmission difficulties occur, perform loopbacks to isolate the problem in accordance with paragraph 3b, lesson 2, learning event 4. If loopbacks indicate that the problem is internal to the Multiplexer Set AN/FCC-100(V), follow the instructions in the next paragraph.

b. Fault isolation. Use the flow charts to troubleshoot the Multiplexer Set AN/FCC-100(V). Be careful, more than one malfunction could occur at the same time. If the probable cause is a bad module, notify the organizational maintenance team.

c. Status checks. Status checks can be performed while the Multiplexer Set AN/FCC-100(V) is on line and passing data. An operator can perform this check using the front panel (or a control terminal, if available). If a control terminal is used, status of all 16 ports and system will be displayed. If the front panel is used, port status and system status will be displayed only when errors are present.

(1) Front panel.

(a) To check status using the front panel, use the NEXT ENTRY key to scroll to ALARM STATUS. Next press MODE SELECT key. The display will show typical example:

PORT 3
ERROR

(b) The NEXT ENTRY key enables the operator to scroll through the remaining port and aggregate error(s), if any. After the last error has been displayed, the NEXT ENTRY key will advance the display back to:

PORT 3
ERROR

(c) If any error is present, pressing RESTART will return the display to:

OPERATION
ALARM

(d) If no error(s) are present, pressing MODE SELECT will change the display from:
ALARM
STATUS

TO:
OPERATION
NORMAL

(2) Control terminal. Instructions on how to use the control terminal to troubleshoot the AN/FCC-100(V) are contained in paragraph 4-4b, chapter 4, section II, TM 11-5805-732-12.

(3) Status errors. There are two port status errors and seven system status errors.

(a) Port error. The port module or port carrier module is bad. Higher level maintenance is required.

(b) Incompatible. Port has wrong configuration. Reconfigure port (refer to paragraph 3e, lesson 2, learning event 4).

(c) Replace AX10. Transmit processor module is bad.

(d) Replace AX11. Receive processor module is bad.

(e) Replace AX12. Shared logic module is bad.

(f) Ports > AGGR. Port rates exceed capacity of aggregate.

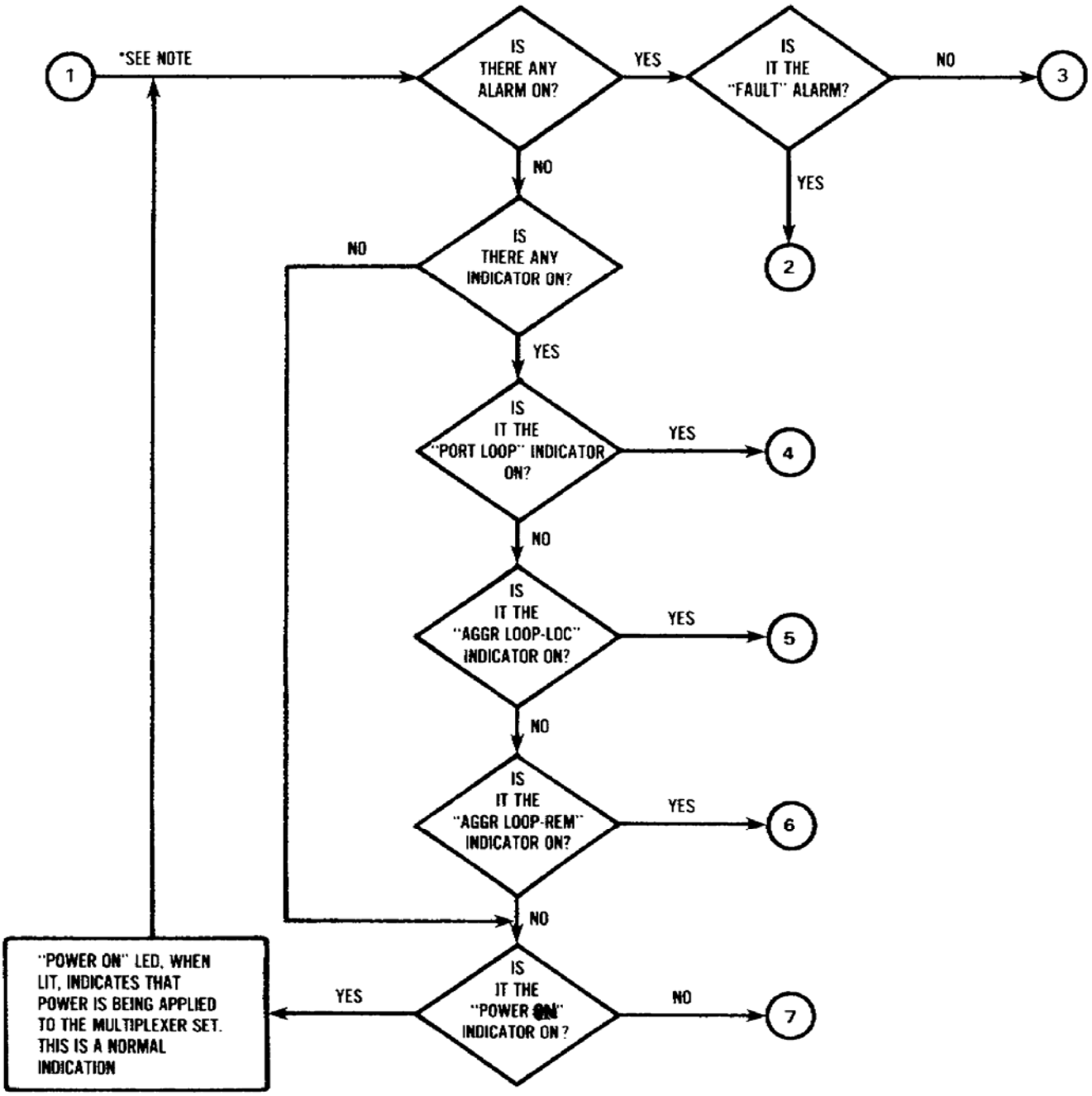
(g) EXT CLK loss. External clock input to AN/FCC-100(V) has been lost.

(h) H/W fault. Bad module. BITE must be performed by organizational maintenance personnel.

(i) Multiple fault. Two or more of the above system errors have been found.

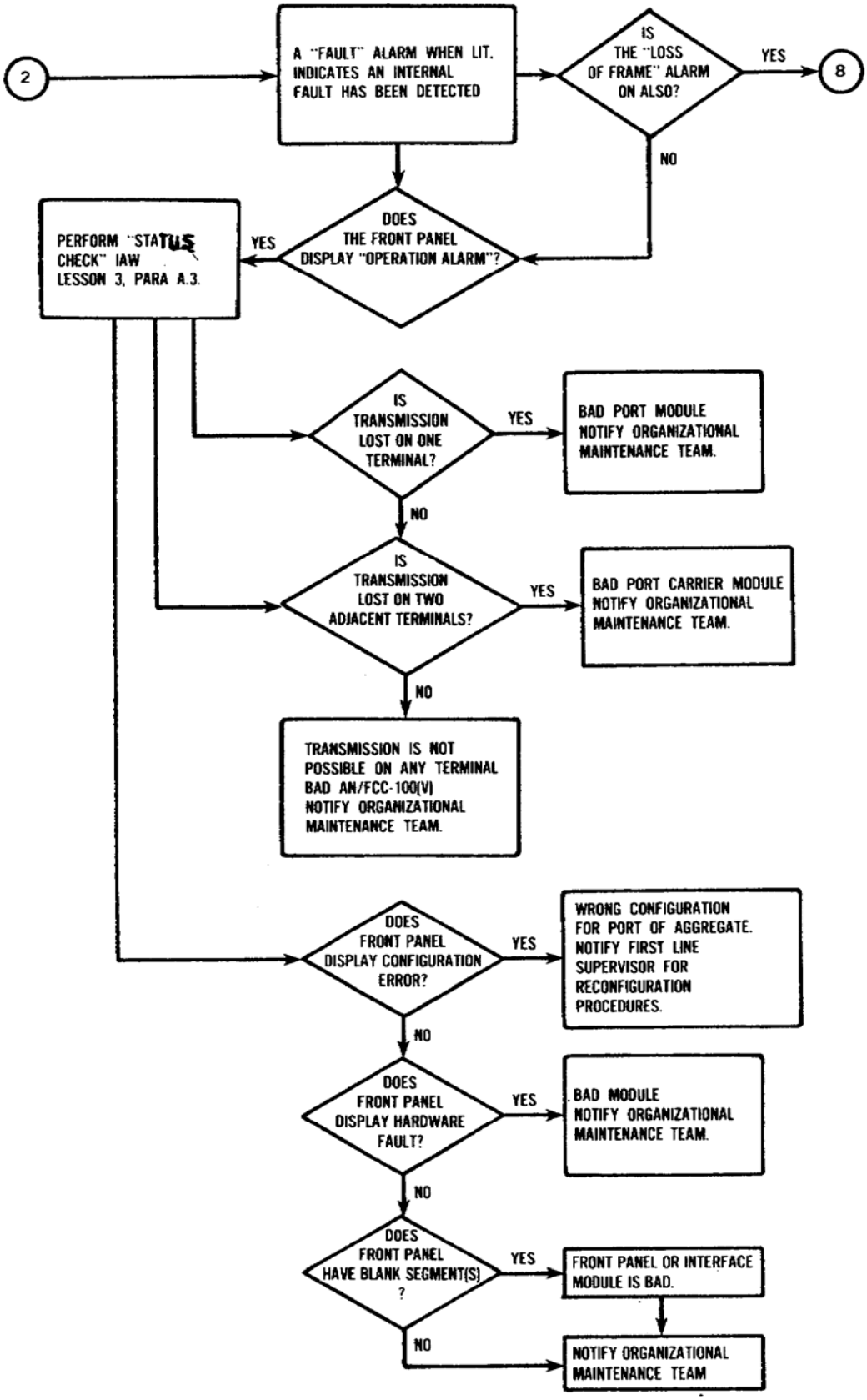
2. Troubleshooting Flow Charts.

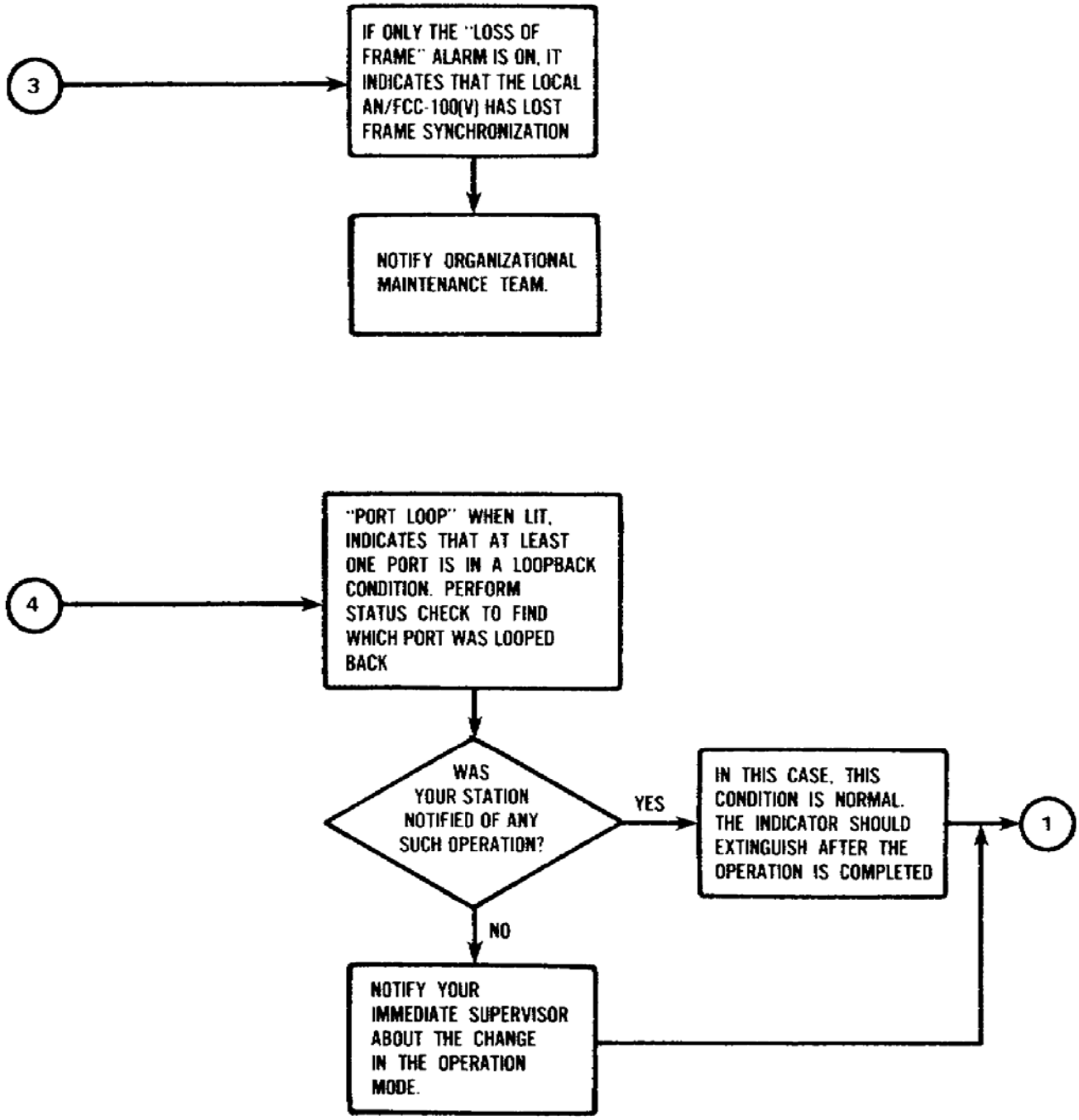
The following flow charts were designed to enable you to troubleshoot the Multiplexer Set AN/FCC-100(V) with maximum efficiency, in the least amount of time. You will start with flow chart 1, and follow the instructions included in the rectangles and diamonds to insure proper procedures are used. One flow chart may direct you to continue to an adjacent flow chart by using the following symbol (5); it means proceed to flow chart 5. At the completion of troubleshooting a problem, you will be required to go back to (1). Even if the problem was solved, your main duty is to insure the constant reliability of the AN/FCC-100(V), by continuously performing at random a visual check for any alarm(s) or abnormal operational conditions. Practice as many times as you need to master the task of troubleshooting the AN/FCC-100(V), then proceed to lesson verification 3.

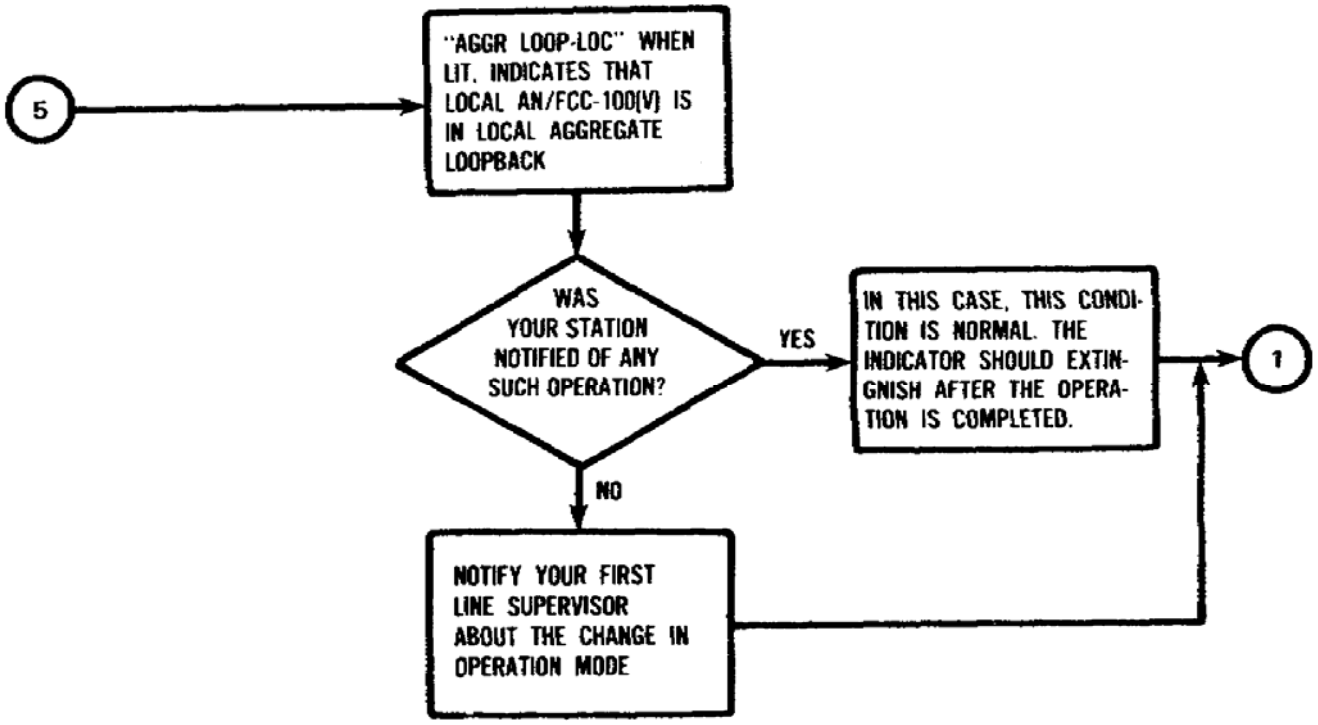


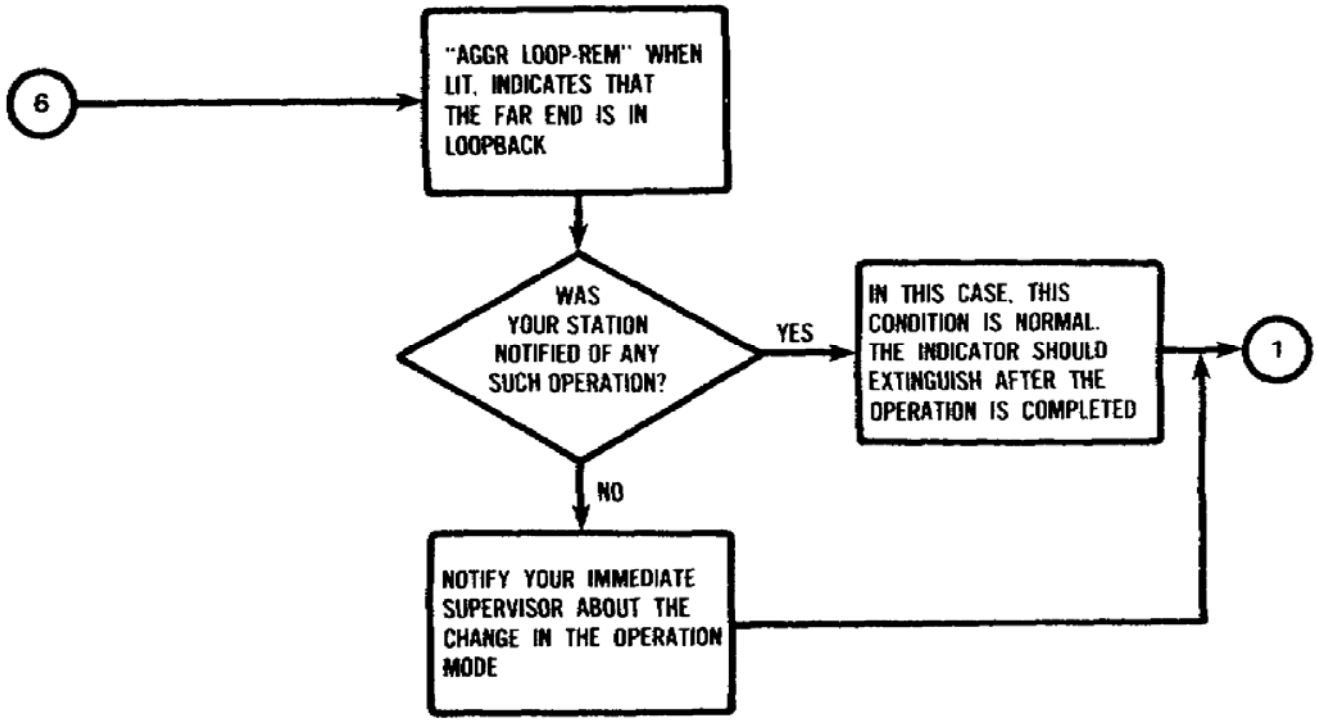

**Caution**

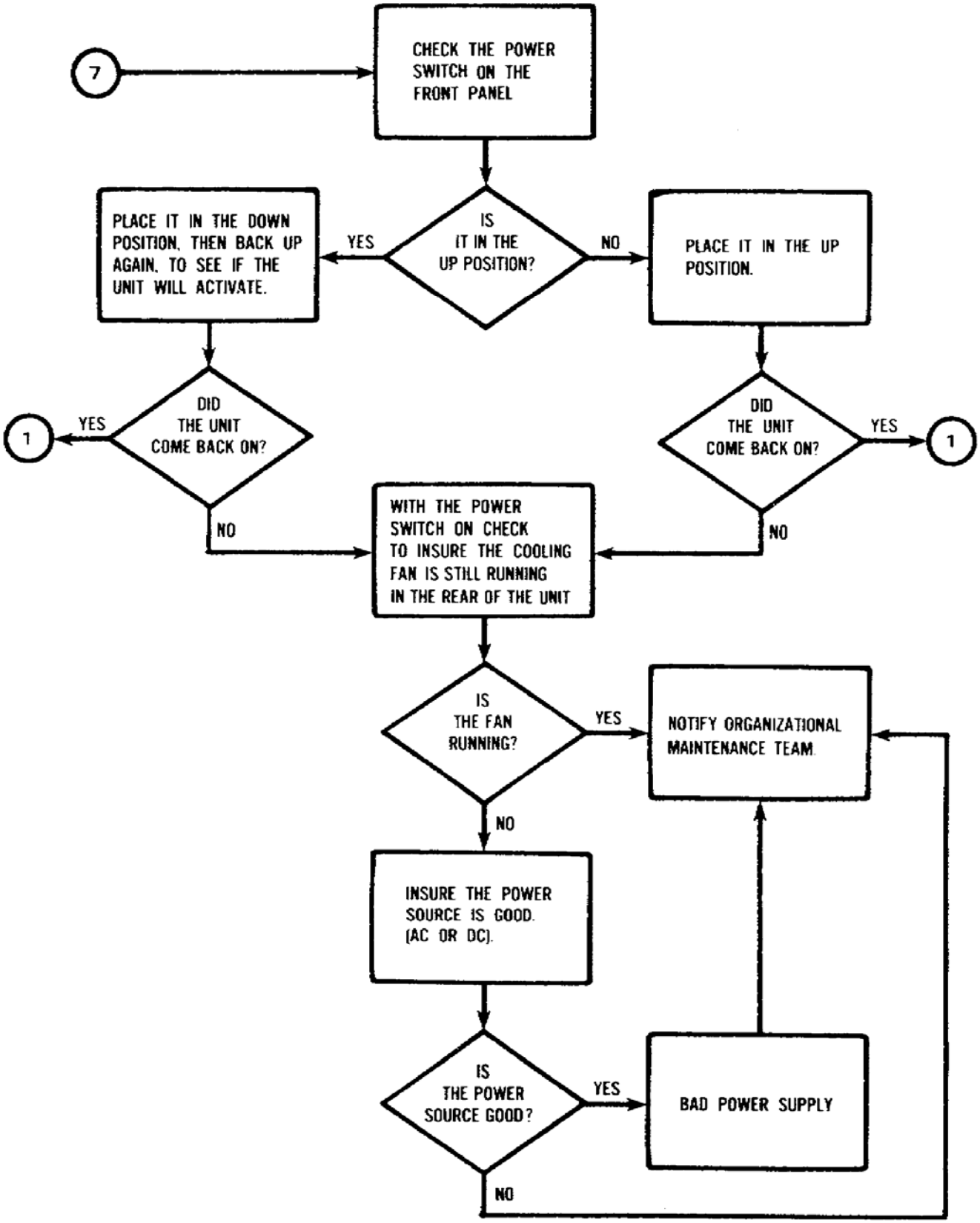
*When troubleshooting, insure that you use the data in Lesson 3 in conjunction with these flow charts. Whenever it calls for replacement of module(s), this action must be taken by organizational level team. Reconfiguration may be initiated at the operator's level provided the first line supervisor authorizes it. During status checks, compare abnormal conditions with the list of possible problems and solutions given through Lesson 3 and the flow charts, and take the actions recommended.

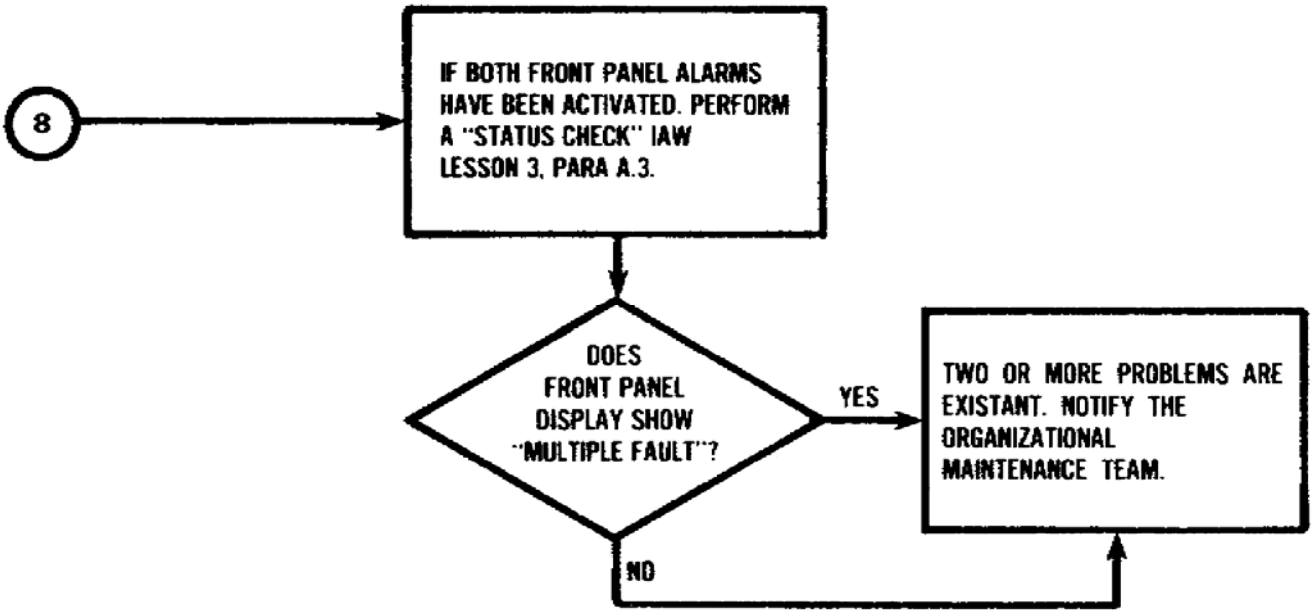










LESSON VERIFICATION 3

INSTRUCTIONS TO STUDENT:

This lesson verification is divided into two sections. Section 1 combines multiple-choice and true/false questions. Section 2 will call for you to use the troubleshooting charts to solve problems, given certain situations and conditions. To complete section 2, you will be under the constant supervision of a qualified repairer. His objective is to train you to the maximum level of effectiveness, not to test you. So, when in doubt, always consult with him before taking any dubious action. Practice as many times possible, until you are satisfied that you can meet the standards of troubleshooting the AN/FCC-100(V). Then proceed to take the posttest. Have your supervisor read the following paragraph.

INSTRUCTIONS TO SUPERVISOR:

Insure student has a No. 2 pencil and paper available for this lesson verification. Section 1 does not require your assistance, but section 2 will require your constant attention to insure the individual is following the right steps of troubleshooting, at the operator's level. You will assist him in all aspects of training, in order for him to become proficient in the troubleshooting of the Multiplexer Set AN/FCC-100(V). When the individual is confident that he has mastered the task, have him proceed to the posttest. Please read the portion of instructions directed to you on the posttest.

SECTION 1

1. When performing operator's maintenance on Multiplexer Set AN/FCC-100(V)(LSTDM), the following tools and equipment are required

   a. screwdriver, pliers, and soldering kit.

   b. long-nose pliers, tuning kit, and screwdriver.

   c. tuning kit, module remover, and volt-ohmmeter.

   d. None of the above.

2. When performing operator's maintenance on AN/FCC-100(V), all corrective actions are performed

   a. through the common equipment modules.
   b. through the front panel or control terminal.
   c. using an external volt-ohmmeter.
   d. All of the above.

3. When performing preventive maintenance checks and services (PMCS)

   a. no operator checks are required.
   b. no operator services are required.
   c. the AN/FCC-100(V) continuously performs self-monitoring automatically.
   d. All of the above.

4. Operator's troubleshooting will be restricted to

   a. replacing module.
   b. removing power supply if necessary.
   c. the isolation of malfunction through the use of loopbacks.
   d. None of the above.

5. Operator's troubleshooting also includes identifying faulty operations, and diagnosing fault indications.

   TRUE FALSE

6. Should transmission difficulties occur, loopbacks will not help you isolate the problem.

   TRUE FALSE

7. If the probable cause of a problem is a bad module, the operator should go ahead and replace it, then notify organizational maintenance about it.

   TRUE FALSE

8. When troubleshooting the AN/FCC-100(V), more than one malfunction could occur at the same time.

TRUE FALSE

9. There is a total of 12 status errors.

TRUE FALSE

10. Replace AX12, indicates to the operator that the shared logic module is bad.

TRUE FALSE

SECTION 2

1. Situation: No alarm indications are on. You observe that the port loopback indicator is on.

a. What would be the next troubleshooting step?

b. In accordance to the conditions above, shouldn't the front panel display:

OPERATION
ALARM

If so, why not?

2. Situation: Fault alarm is activated. Front panel displays:

OPERATION
ALARM

After performing a status check, the front panel has blank segments.

a. What is most likely the problem?

b. What level of maintenance is required?

3. Situation: Fault alarm is activated. Front panel displays:

OPERATION
ALARM

After performing status check, all indications point to a defective port carrier module.

a. What result would such condition have on transmission of data?

b. What level of maintenance would be required to resolve the problem?

KEY ANSWER SHEET TO LESSON VERIFICATION 3

SECTION 1

1. d, learning event 1.
2. b, learning event 1.
3. d, learning event 2.
4. c, paragraph 1, learning event 3.
5. True, paragraph 1, learning event 3.
6. False, paragraph 1a, learning event 3.
7. False, paragraph 1b, learning event 3.
8. True, paragraph 1b, learning event 3.
9. False, paragraph 1c(3), learning event 3.
10. True, paragraph 1c(3)(e), learning event 3.

SECTION 2

1. a. Perform status check to find which port has been placed in loopback.
   b. No. Operation alarm is only activated when an error is present.
2. a. Either the front panel or the interface is bad.
   b. This calls for organizational level maintenance.
3. a. Loss of two adjacent terminals (ports).
   b. Organizational level maintenance.

POSTTEST

TEXT ASSIGNMENT:
SOJT Extract, GTA 11-10-32

MATERIALS REQUIRED:
Pencil and paper

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In each of the following exercises, select the ONE answer that BEST completes the statement or answers the question. Indicate your solution on the examination response sheet as per instructions on sheet.

SECTION 1

This section is a review of all lessons included in this subcourse. You will need a separate sheet of paper and a pencil to answer all 20 questions. This portion will not be graded, but the answers will be verified by your supervisor for accuracy. There are multiple-choice and true/false questions. When answering the questions, provide the reference used so your supervisor will be able to verify your answers. Once you have completed section 1, proceed to complete section 2 after your supervisor initials your completed work.

1. How many ports are available with the LSTDM, AN/FCC-100(V) ?

   a. 8
   b. 24
   c. 16
   d. 36

2. The Multiplexer Set AN/FCC-100(V) uses

   a. FDM.
   b. PCM.
   c. TDM.
   d. None of the above.

3. The module which contains the circuitry required by both the transmit and the receive processor modules is the

   a. shared logic module.
   b. port carrier module.
   c. BITE module.
   d. None of the above.

4. The _____ is the physical and electrical link between the operator/organization maintenance personnel and the interface module.

   a. interface module
   b. power supply
   c. chassis
   d. front panel

5. In a diphase type of port

   a. a single bit stream carries only data.
   b. a single bit stream carries both user data and associated timing.
   c. a single bit stream carries only external clock.
   d. All of the above.

6. For a total aggregate rate of 128 K, what should the acceptable overhead bandwidth be?

   a. 1600
   b. 50
   c. 400
   d. 800

7. If the total rate values of six different ports (diphase and syn) adds up to 9600, what is the acceptable rate for synchronous NRZ port of 75?

   a. 50

   b. 150

   c. 75

   d. None of the above.

8. If port 1 is a diphase type, which of the following rates will it not accept?

   a. 75

   b. 1800

   c. 1200

   d. 64 K

9. Using the data provided below, compute the aggregate acceptable for the port mix.

| | | |
|---|---|---|
| Port 1 | SYN | 150 |
| Port 2 | SYN | 4800 |
| Port 3 | DI | 75 |
| Port 4 | DI | 1200 |
| Port 5 | ISO | 67 |
| Port 6 | ISO | 75 |
| Port.7 | ISO | 75 |
| Port 8 | ISO | 300 |

   a. 9600

   b. 1200

   c. 4900

   d. 9000

10. TM 38-750 governs Department of the Army forms and procedures used for equipment maintenance.

    TRUE FALSE

11. On Power Supply Group OP-143/FCC-100(V), the AC supply provides the necessary DC voltages from either a 115 or a 230 volts DC source.

TRUE FALSE

12. Control of the AN/FCC-100(V) is performed by the transmit processor and the receive processor modules.

TRUE FALSE

13. There are two oscillator circuits in the AN/FCC-100(V).

TRUE FALSE

14. The software BITE does not interrupt user data traffic like the hardware BITE does.

TRUE FALSE

15. With the BITE probe connected to 40 Hz 2-volt peak square wave, the H1 LED will flash at 40 times per second and will appear to remain steady. The PLS LED will be off.

TRUE FALSE

16. The eight front panel keys permit an operator to select a mode and scroll through sets of parameters.

TRUE FALSE

17. There are eight modes of operation for the AN/FCC-100(V).

TRUE FALSE

18. Jumpers 5 and 6 of the port carrier module set the termination for transmit data on the odd port.

TRUE FALSE

19. The (LSTDM) Multiplexer Sets AN/FCC-100(V) performs self-monitoring continuously and automatically. No preventive maintenance checks and services (PMCS) are required.

TRUE FALSE

20. Status check can be performed while the AN/FCC-100(V) is on line and passing data.

TRUE FALSE

SECTION 2

In order to perform this section, you must have a supervisor to assist you. Have him read the following paragraph.

INSTRUCTIONS TO SUPERVISOR:

Insure the individual to be tested has a copy of SOJT Extract, GTA 11-10-32, pencil (No. 2), paper, and an operational AN/FCC-100(V). Additionally, you must provide him a spare module as indicated, and access to AN/FCC-100(V) so he can perform a configuration. The configuration mode will in no way affect data traffic; it will put the new information provided in the off-line memory. The only time it would affect traffic is if the individual activates the local or the remote and local system. This is one of the main reasons why you must keep a close look at what the individual under test is accomplishing.

You, the supervisor, will be scoring the individual on his ability to accomplish the tasks by for a GO or NO-GO. To achieve a GO the individual must perform accurately two out of the three tasks presented.

At this time, provide the individual a spare port carrier module for the strapping portion, and have him strap that module in accordance with data in paragraph 1. There is a 10-minute time limit.

1. Situation: Having been provided a spare port carrier module, strap it for the following:

   a. Transmit data even port: Diphase.

   b. Receive data even port: 124-ohm balanced.

   c. Transmit data odd port: Diphase.

   d. Receive data odd port: 124-ohm balanced.

To verify if the module is properly strapped, use figure 18. All strapping must be correct, otherwise the individual will have failed the task.

For this portion the individual will require the use of an operational AN/FCC-100(V), and any port of your choice, to perform a configuration in accordance with data provided in paragraph 2. There is a 10-minute time limit.

2. Situation: Configure the port selected by your supervisor for the following (without activating it):

SYN
NO-LB
1200
POS-MARK
INT-CLK

To verify the individual has performed the configuration correctly, perform the steps of the mode of operation called examine off line. If the configuration is correct, shade A on his ACCP answer sheet for a GO and B for a NO-GO if the configuration is incorrect; A or B of number 21 on ACCP response sheet.

This portion covers troubleshooting of AN/FCC-100(V). Since a problem cannot be inserted in the equipment for testing purpose, the individual will be presented a hypothetical situation, which he must solve, using troubleshooting charts. These flow charts are included in SOJT Extract. There is a 15-minute time limit.

3. Situation: Fault alarm is activated. Front panel displays:

OPERATION
ALARM

a. What will be your next action?

b. After performing the status check, the front panel display indicates hardware fault. What level of maintenance is required at this point?

To verify the correctness of his answers, you can check flow charts 1 and 2. If the service member answered correctly, shade the A to number 22 on ACCP response sheet. If the individual didn't answer correctly, shade B to number 22 on ACCP response sheet. After you have completed the test, mail in the ACCP response sheet to IPD in the envelope provided. The IPD will provide the individual a copy of his score.

KEY ANSWER SHEET TO POSTTEST

SECTION 1

1. c, paragraph 2a, lesson 1, learning event 2.
2. c, paragraph la, lesson 1, learning event 2.
3. a, paragraph 2c(3), lesson 1, learning event 2.
4. d, paragraph 2c(8), lesson 1, learning event 2.
5. b, paragraph la, lesson 2, learning event 1.
6. a, table IIIC, GTA 11-10-32.
7. b, table IIIA, GTA 11-10-32.
8. b, table I, GTA 11-10-32.
9. a, paragraph 1, lesson 2, learning event 2.
10. True, lesson 1, learning event 1.
11. False, paragraph 2c(9), lesson 1, learning event 2.
12. True, paragraph 3d, lesson 1, learning event 3.
13. True, paragraph 3c, lesson 1, learning event 3.
14. False, paragraph 3f, lesson 1, learning event 3.
15. False, paragraph 3g(c) 3, lesson 1, learning event 3.
16. True, paragraph 1a, lesson 2, learning event 4.
17. False, paragraph 2, lesson 2, learning event 3.
18. False, paragraph 1d, lesson 2, learning event 3.
19. True, lesson 3, learning event 2.
20. True, paragraph 1c, lesson 3, learning event 3.

SECTION 2

1. Module should be strapped as follows:

   a. Transmit data even port: Diphase.

   b. Receive data even port: 124-ohm balanced.

   c. Transmit data odd port: Diphase.

   d. Receive data odd port: 124-ohm balanced.

2. When performing examine off line the selected port should read as follows:

   PORT _____: SYN
   NO-LB
   1200
   POS-MARK
   INT-CLK

3. a. Next action should be to perform status check.

   b. Organizational.